Companies Treating Computers Better Than Programmers?

By Don Leavitt
Of the CW Staff

SAN FRANCISCO — Many companies treat their computers better than they treat their software staffs.

As a result, they have good equipment, "but their people quickly become obsolete and unaware of current advances in the field," Anthony I. Wasserman of the University of California, San Francisco, charged at the Computer Caravan here last week.

Companies not only provide "comfortable, environmentally controlled settings" for their computers, but they are also concerned about the equipment's welfare "to the extent that they provide health care — preventive maintenance"— for it, the professor noted.

Furthermore, he said, companies frequently upgrade or enhance their computer systems with additional components or new operating systems in order to prolong their usefulness and to prevent them from becoming technologically obsolete.

By contrast, many of these same companies expect people joining their professional software staffs to possess all the necessary technical skills. Any training they get is directed toward making them understand the operation and structure of the company, Wasserman continued.

"There is little in the way of a technical library ex-

Caravan coverage continues on Page 7.

cept trade publications. People are rarely sent to technical conferences and very little money is spent for professional development courses or education, apart from the very narrow subjects taught by computer manufacturers," he said.

The result of such a lack of investment in professional development is that the quality of the software staff simply erodes, Wasserman indicated.

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COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

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NEWSPAPER

158, 168 Marked Down; IBM Adds Top 370 CPU

By Esther Surden
Of the CW Staff

WHITE PLAINS, N.Y. — In what seemed like a clearance sale to industry observers last week, IBM slashed purchase prices on the CPUs and memory used in its 370/158 and 168 systems.

Simultaneously, the mainframer introduced a lower cost processor for the 370 line — not a system — said to operate 1.6 to 1.8 times faster than the 370/168-3 CPU. The 3033 CPU will be available in the first quarter of 1978.

The company announced a 30% purchase price reduction on processing units used in the 370/158 and 168 and a 35% purchase, rental and lease price reduction on its Mosfet main memory.

The overall effect of the price cuts is a 26% decrease in system cost for the 168-3 and a 30% cut for the 158-3.

A 168-3 CPU with 4M bytes of main memory and seven channels now costs $3,697,564. This is a reduction of $1,276,490 from the previous cost of $4,974,054.

The 158-3 with 2M bytes of main memory and five channels costs $1,584,865. It previously cost $2,266,765, a difference of $681,900.

Lease and rental prices for the systems were cut by 6%, IBM said. The 158-3 with 2M bytes of main memory and five channels, for example, previously cost $47,505/mo on a 48-month lease. It now costs $44,640/mo — a $2,865/mo difference.

A 168-3 with 4M bytes of memory and seven channels formerly leased for $106,306/mo and now costs $100,381/mo — a $5,925 difference.

The 3033 is now IBM's top-of-the-line 370 processor. Described as smaller and faster than the 168-3's CPU, it features 12 standard channels.

When asked if the 3033 will replace the 168, a spokesman said, "Both machines are currently in the product line and the choice will depend on the user." The 158 and 168 were introduced in 1972 while the 168-3 and 158-3 were announced in March 1975.

(Continued on Page 4)

Amdahl Echoes IBM With Own Price Cuts; Expands 470 Series

By Esther Surden
Of the CW Staff

SUNNYVALE, Calif. — Amdahl Corp. took only 72 hours to respond to IBM's price cuts with a similar price reduction and more.

In addition to slashing the price of its 470V/6-II system by nearly 30% — the same cut made by IBM — the mainframe competitor last week announced a 470V/5 and a 470V/7 to expand its product line.

At the same time, Amdahl said it will withdraw the 470V/6 system from production, effective in September, in favor of the 470V/6-II with a 32K-byte buffer twice the size of the 470V/6 buffer [CW, Feb. 14].

A 4M-byte 470V/6-II previously cost $4,635,000. It now costs $3,280,000.

Described as more powerful than IBM's 3033 processor, the 470V/7, available in August 1978, is said to perform 1.5 to 1.7 times faster than the 470V/6. It uses the same basic architecture of both the 470V/6 and the IBM 370.

Current 470V/6 users cannot upgrade in the field to the 470V/7; the entire CPU unit must be replaced, Amdahl said.

(Continued on Page 4)

CW Photo by J. Hebert

ATLANTA — An estimated 6,500 data communications users and others attended the Interface '77 conference here last week. About 135 exhibitors displayed various telecommunications products and services and about 70 technical sessions were included in the three-day show at the World Congress Center (see pages 8, 10 and 11).

CRT for X.25 Packet Networks Among Debuts at Interface '77

By Ronald A. Frank
Of the CW Staff

ATLANTA — A demonstration of synchronous CRT terminals emulating IBM 3270 mode that can operate on a packet-switched network was featured at the Interface '77 data communications conference here last week.

Raytheon Data Systems Co. showed its CRT terminals operating with software that included compatibility with the CCITT X.25 protocol.

The software included DMEP-II from Cambridge Telecommunications of Bedford, Mass., which replaces control and emulation programs in the IBM 370X front-end processors. Also used for the demonstration was Raypac software designed to be loaded into local-site Raytheon PTS-100 terminal controllers.

DMEP-II and Raypac, when installed on 32K configurations of the PTS-100 operating in 3270 emulation mode, will allow the terminals to access public packet networks using the X.25 and Higher Level Data Link Control protocols, Raytheon said.

The DMEP-II software costs $1,000/mo and Raypac costs $100/mo. A 3270 concurrency feature which lets the PTS/1200 CRT both operate in 3270 mode and perform local processing costs $85/mo. The software prices are based on one-year license terms.

Paradyne Corp. of Largo, Fla., demonstrated its Virtual Data Link System over a satellite link using the PIX II processor. The system is being operated at Yamaha

(Continued on Page 8)

CDC Extends Cyber 170 Family

By Frank Vaughan
Of the CW Staff

NEW YORK — Control Data Corp. announced two additions to its Cyber 170 medium- to large-scale computer line last week.

The Cyber 171, an entry-level, medium-scale system said to be comparable to the IBM 370/148, leases for less than $20,000/mo. The Cyber 176 is in the class of the largest commercially available mainframes and leases for about $150,000/mo.

Both systems utilize the same operating systems and distributed network processing architecture as do other models in the Cyber 170 line.

CDC is targeting the Cyber 171 at the user who makes price rather than performance the key in choosing among competing systems, according to a CDC spokesman. This user plans to spend $10,000 to $30,000 a month.

The Cyber 176, on the other hand, is being targeted at the CDC customer whose requirements have outgrown the capacities and capabilities of his current systems, the spokesman added.

The Cyber 176 has 18 times the performance of the Cyber 171, he said.

Customer shipments of the 171 will begin in July; initial shipments of the 176 are

(Continued on Page 6)

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Please address all correspondence to the appropriate department at 797 Washington Street, Newton, Mass. 02160. Phone: (617) 965-5800. Telex: J2424461.

OTHER EDITORIAL OFFICES: England: Computerworld Publishing Ltd., 140-146 Camden Street, London NW1 9PF. Phone: (01) 485-2248/9; Telex: 264737. **W. Germany:** Computerworld, c/o Computerwoche GmbH, 8000 Munchen 40, Tristanstrasse 11. Phone: 36-40-36/37. Telex: 5215350. **Asia:** Computerworld, c/o Dempa/Computerworld Company, Dempa Building, 1-11-15, Higashi Gotanda 1-chome, Shinagawa-ku, Tokyo 141. Phone: (03) 445-6101. Telex: J2424461.

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Being Installed This Week

Vadic Non-DAA Modem Gets FCC Nod

By Ronald A. Frank
Of the CW Staff

MOUNTAIN VIEW, Calif. — Sometime this week, a modem user in the Midwest will disconnect his telephone company Data Access Arrangement (DAA). He'll replace it with a modem connected directly to the telephone network by the plug-and-jack arrangement approved by the Federal Communications Commission (FCC).

The modem is a Vadic Corp. VA317S, which is reportedly the first of its type to complete the long-form technical requirements of the FCC registration procedure.

The VA317S operates at 300 bit/sec and is available in a single circuit board configuration that can directly replace earlier nonregistered versions of the Vadic modem installed at user sites.

It is also available as a complete data set for new installations, Vadic noted.

Registered VA317S units will be connected to the phone network using a data jack installed by local telephone companies. By eliminating the DAA, users will save $4 to $8 per month for each noncarrier data set they have in operation.

The VA317S connects to the switched telephone network through the "programmable" Bell data jack (Model RJ45S). A resistor inside the data jack determines modem transmit level.

Mechanically, the data jack provides a standard Bell miniature eight-pin connector with a keyway design, Vadic said.

The Vadic unit comes equipped with a cable and keyed data jack that mates with the jack. Bell will install the jack either in wall mountings or in multiple modem cabinets for large installations.

Began Last February

Vadic first began the registration procedure last February. Technical parameters were tested by Gaines M. Crook & Associates of Chatsworth, Calif. The test data was then submitted to both the FCC's engineering office and AT&T.

Bell answered with a technical response that asked some detailed clarifications of the test results, according to one engineering source. After some delay, Bell apparently agreed the Vadic data set met the FCC specifications, the source said.

Other registration applications now pending are being delayed by telephone company requests for more technical details, the source added.

An FCC spokesman said the Vadic unit had been approved by the technical staff and final approval of the registration is "imminent."

The VA317S has the capability to attach to a data jack directly, a Bell CBS DAA, a Bell CBT DAA or a leased 2-wire telephone line.

The VA317S costs $425 or $250 for the circuit board-only version. Delivery is 30 days from Vadic at 505 E. Middlefield Road, Mountain View, Calif. 94043.

Tenn. Governor May Sign Bill Defining Software as Taxable

By Molly Upton
Of the CW Staff

NASHVILLE, Tenn. — Tennessee Gov. Ray Blanton may sign a bill this week that would define software as tangible personal property, thus subjecting it to the state's 5% sales and use tax.

The legislation does not mention taxing of DP services.

Although the Tennessee Supreme Court ruled software is intangible regardless of the method of transmission in the case of Commerce Union Bank vs. George M. Tidwell [CW, Aug. 30], the governor's office seems intent on pitting legislation against the court's ruling.

"We're familiar with the court cases and the present law" as it is generally construed "and we're going to test it out," according to legislative aid Nelson Biddle.

House Bill 251 and Senate Bill 224 are part of the governor's legislative package, Biddle said. If the final legislation is enacted, the resulting tax on software is expected to yield $250,000 for the state and $100,000 for localities annually, he said.

Currently, the only delay in having the legislation reach the governor's desk for signature is the need for the Senate to concur on a "housekeeping" amendment passed by the House, Biddle said.

Members of the DP community have expressed some concern and a hearing has been requested before the governor puts pen to paper. One such member is Robert Sherrin, president of Nova Computing Services in Miami.

Sherrin, whose case brought under Florida's administrative procedures act resulted in the state exempting software from taxation, said he is seeking time to explain the issue to Blanton.

Tennessee law defines tangible personal property as "personal property which may be seen, weighed, measured, felt, or touched, or is in any other manner perceptible to the senses." And that applies to the media on which software is contained, Biddle said.

The state would levy the tax on the sales price of the disk or tape containing the information rather than on the price of the media alone, he added.

Tidwell Ruling

On the matter of taxing media, the Tidwell ruling stated: "What is created and sold here is information, and the magnetic tapes which contain this information are only a method of transmitting these intellectual creations from the originator to the user."

"It is merely incidental that these intangibles are transmitted by way of a tangible reel of tape that is not even retained by the user."

The court observed that the data could be transferred by other media or other means, such as electronically without "any tangible manifestation of transmission.

"That method of transmission, without question, constitutes the purchase of intangible personal property. The principle is the same, only the method of transmitting the information differs," the State Supreme Court ruled.

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ADR's The LIBRARIAN®/Online Speeds Program Development, Increases Productivity, and Bypasses Delays for Colonial Life Insurance Co.

In mid-1975, Colonial Life installed The LIBRARIAN for greater program security and more efficient program management. A year later, The LIBRARIAN/Online was added to further reduce programming time through online system access.

Working under batch, Colonial Life's programmers were often delayed a week waiting to complete a simple update. Waiting for keypunch. Waiting for remote testing. Waiting for hardcopy output.

The LIBRARIAN/Online bypassed these delays by giving the programmer a direct means of entering, reviewing, and retrieving data without hardcopy input or output. Programmers now display program modules, make changes at the terminal, submit them, and get the compilation output back in a matter of minutes.

Now even the biggest jobs can be ready for testing in less than a day...

"And our programmers have a lot more control. Because time lapses have been eliminated, they don't have to reorient themselves all the time to continue a job," said Howard Lackow, Second Vice President for Data Processing.

The LIBRARIAN/Online is a source program management system with complete Remote Job Entry and Remote Job Output facilities. Its interface to The LIBRARIAN gave Colonial Life online access with a full range of module updating and control functions.

Second Vice President Howard Lackow points to the steady increase in source code output since installation of LIB/OL.

The LIBRARIAN/Online is operational under both OS and DOS and supports CICS and other teleprocessing monitors. All of the updating functions available to programmers working in a batch LIBRARIAN environment can be invoked from teleprocessing terminals.

LIB/OL gave online access with a full range of module updating and control functions.

The LIBRARIAN is a four-time DATAPRO Software Honor Roll winner installed in over 3,500 installations, and The LIBRARIAN/Online is currently installed at over 250 of those sites.

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IBM Slashes 158, 168 Prices; Adds Top CPU to 370 Family

(Continued from Page 1)

Present IBM 370 users cannot upgrade from their processors to the 3033 in the field, IBM said.

The 3033 with 4M bytes of main memory and 12 channels costs $3,380,000; a comparably configured IBM 370/168-3 costs $4,307,104, according to the spokesman. Both 6M- and 8M-byte versions of the 3033 are also offered.

The 3033 is a single processor and is not available in either attached-processor or multiprocessor versions, IBM emphasized.

The 3033 features enhanced logic circuitry and a 58 nsec CPU cycle time compared with an 80 nsec cycle time for the 168-3. The circuitry makes use of bipolar technology that has "about 44 circuit sites per chip compared with a circuit average of from four to 12 on the chips used on the 168-3," the spokesman noted.

The processor has a 64K-byte buffer storage capacity compared with the 32K-byte buffer available on the 168-3 CPU.

Dual-Display Console

A dual-display console is standard with the 3033. Designed to allow maintenance tasks to be performed through one of the consoles while the other is being used, the dual station contains two CRTs, two keyboards, console files and I/O channel connections.

Maintenance can be performed on six channels at a time, the spokesman explained. Operators at either console have access to the full system except while it is being maintained, the company noted.

The 3033 processor has 12 standard integrated and four optional channels compared with the 168-3, which has no standard channels. The channels on the 168 are external to the CPU.

Each group of six channels includes one byte-multiplexer channel and five block-multiplexer channels. The byte-multiplexer channel operates in the range of 40,000- to 75,000 byte/sec and each block multiplexer has a maximum transfer rate of 1.5M byte/-sec.

Users can optionally attach a 2-byte wide, 3M byte/sec channel which replaces the first block multiplexer in each set, IBM said. A channel-to-channel adapter allows users to loosely couple systems for job sharing, the spokesman reported.

The 3033 uses the System/370 Extended Facility supported by the MVS/System Extensions program product, introduced with the processor.

MVS/System Extensions "reduces the amount of processor execution time needed to perform high-frequency control program functions through the reduction of path lengths and software contention," the spokesman explained.

The path lengths have been reduced for "several frequently executed functions," IBM said, and some functions have been taken out of software and placed in microcode.

"Areas of potential contention have been reduced by eliminating some serialization points and reducing the time spent serializing some system resources," the spokesman added.

MVS/System Extensions can also be used on the 158 and 168 as well as their attached-processor and multiprocessor versions equipped with the System/370 Extended feature.

IBM has also enhanced the Virtual Machine Facility/370 (VMF/370) through the use of a program product called VM/System Extensions. This product is said to provide improvements in resource management, resulting in improved throughput and better terminal response time.

The 3033 is also supported by OS/VS2, MVS, Single Virtual Storage (SVS) and by the VM/370 and Airline Control Program (ACP) operating systems. The support of ACP was announced because "there are some users for whom this is a significant program," IBM said.

The 3033 with 4M bytes of memory costs $3,380,000 to purchase, leases for $70,400/mo on a 48-month contract and rents for $77,430/mo. With 6M bytes, the unit costs $3,605,000, leases for $77,480/mo and rents for $85,210/mo. The 8M-byte version costs $3,825,000, rents for $92,810/mo and leases for $84,400/mo.

MVS support for the 3033 will be available with the first system while VM/370 and ACP will be available in the first quarter of 1978. SVS support will be available in the second quarter, IBM said.

The MVS/System Extensions program product costs $1,250 and will also be available in the first quarter of 1978, IBM said. VM/System Extensions, also available then, will carry a monthly license fee of $1,200.

The cost of the System/370 Extended feature for the models 158 and 168 varies according to configuration, IBM said. For the 168 and 168-3, it will cost $65,000 to purchase, $3,575/mo to rent or $3,250/mo to lease with a $50/mo maintenance charge.

A duplicate System/370 Extended feature is needed in an attached-processor configuration, the spokesman said.

Small Systems Reduced, Too

ATLANTA — IBM's clearance sale continued last week with purchase, lease and rental price cuts for its small systems.

Cuts up to 35% in purchase price, effective March 29, were announced. Rental and lease price reductions of 2% to 7%, memory increment cost cuts up to 35% and drops up to 30% in some CPU prices were effective April 1.

Prices were reduced for the memory increments of the IBM 3, 5100, 3741 data station and Series/1. For example, it now costs $1,750 to go from 32K to 48K bytes of memory on an IBM 3/12; the 16K increment previously cost $2,700.

The IBM 32's 8K-byte memory increment was reduced from $1,350 to $878.

Purchase price cuts affect the following systems: IBM 7 models A, B and E; IBM 3/4, 3/8, 3/12 and 3/15; 360/20; and the older 1130, which is the only one of the products affected that has been withdrawn from active marketing.

The 3/15-A17, formerly priced at $65,510, now costs $62,235; the 3/15-D24, now at $124,480, formerly cost $143,940. The 3/12-B16, which was priced at $50,465, now costs $47,940.

The IBM 7 Model E-64 has been reduced from $79,320 to $59,490.

IBM said the price reductions were a result of both "normal business review" and "improved manufacturing technology" for its memory.

Amdahl Also Makes Price Cuts, Extends 470 Line

(Continued from Page 1)

The system features 12 standard in-board channels and four optional channels as opposed to the 16 integrated channels standard on the 470V/6.

The channels can be installed in any combination of selector, byte multiplexer or block multiplexer, Amdahl said.

Each block-multiplexer channel or selector channel in burst mode can handle a data transfer rate of about 2M byte/sec. Byte-multiplexer channels have a bandwidth of about 110K byte/sec; the total bandwidth for all 12 channels is "installation dependent," Amdahl explained.

The 470V/7 has a 32K-byte buffer. Memory transfer width to the buffer is 8 bytes and CPU transfer width from the buffer is 4 bytes, the firm added.

The buffer features enhanced error-checking capabilities and the ability to handle unassigned operands and instructions for fault isolation and correction, Amdahl said.

The processor's instruction set includes the standard full IBM System 370 Universal Instruction Set with extended floating-point operations, direct control and IBM 370 instruction enhancements, Amdahl noted.

The Translation Lookaside Buffer (TLB) has been enhanced for the 470V/7. The 512-entry buffer provides a two-way set associative storage of the most recently used virtual address translation information.

A 128-entry segment table origin stack identifies specific address spaces with TLB entries, the firm noted.

Main storage for the system can range from 4M- to 16M bytes in 4M-word increments. Memory access is on a double-word basis interleaved 16 ways, the firm said.

A denser memory will allow the user to gain the maximum of 16M bytes by reducing space, Amdahl added.

The system console performs both operations and maintenance functions for the 470V/7 as well as providing an interface to Amdac, which is used for remote maintenance by headquarters personnel.

Optional features include a channel-to-channel adapter which can be attached to either a selector or block-multiplexer channel and uses one control unit position on each channel. The system can be linked to an IBM 360 or 370 with the channel-to-channel adapter on either system, Amdahl said.

The optional 2-byte interface effectively doubles the bandwidth for control units that support the standard 1-byte wide channel interface. It can be used on all selector and multiplexer channels, the firm stated.

Amdahl is extending MVS, SVS, VM and MVT to operate on the 470V/7.

The 470V/5 is said to have about two-thirds the power of the firm's 470V/6-II.

Two and a half times more powerful than the IBM 158, the system uses the same basic architecture as the 470V/6-II and can be field-upgraded to that system, Amdahl claimed. The field upgrade costs $780,000.

Both 2M- and 3M-byte versions of the processor are often compared with a minimum of 4M bytes for the 470V/6-II. A maximum of 6M bytes of storage is available. The buffer on the system is 16K bytes.

The 470V/5 includes eight in-board channels that can be configured in any combination of byte multiplexer, block multiplexer or selector configuration. Both a channel-to-channel adapter and 2-byte interface are optional, Amdahl said.

The system, which will be available in September, runs under MVS, SVS, VM and MVT. VS1 will also be supported.

The minimum-configuration 470V/7 system with 4M bytes of memory costs $3,480,000. The 2M-byte 470V/5 costs $2,430,000.

The channel-to-channel adapter costs $32,500 while the 2-byte interface costs $1,400. The optional channels for the 470V/7 cost $150,000. Amdahl is located at 1250 E. Arques, Sunnyvale, Calif. 94086.

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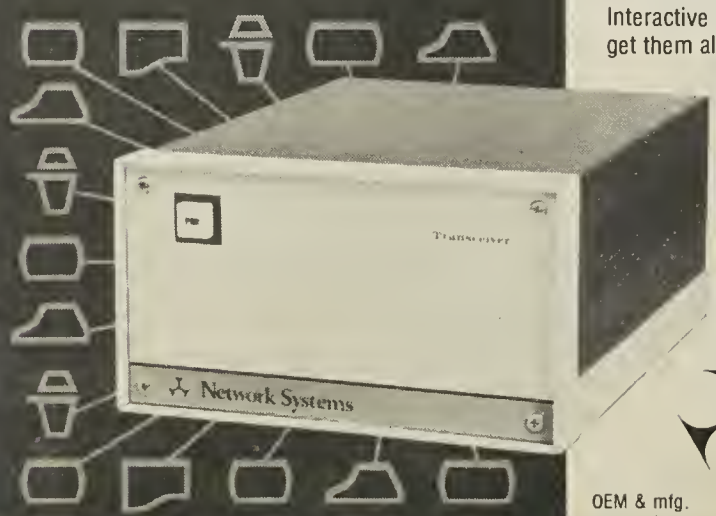

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Justice Trims Witness List

NEW YORK — The Justice Department has dropped 10 names from its witness list for the U.S. vs. IBM antitrust trial in an attempt to shorten this almost two-year-old trial.

U.S. attorney Raymond Carlson announced the names of those who were deleted from the list in court recently and predicted a Labor Day finish for the government's direct case. The Justice attorneys have almost completed the documentary portion of the case, which is also the most voluminous (2,200 documents have been entered into evidence so far).

Approximately 26 live witnesses will be left to testify for the government after these most recent cuts.

Those who will not be called to testify are Ronald Derby, manager of long-range planning for California Computer Products, Inc.; Zoltan Herger, vice-president of Storage Technology Corp. (STC); James MacQuire, executive vice-president of STC; Norman Lourie, former vice-president of Cambridge Memories, Inc.; and Philip Friend, a consultant with Quantum Science Corp.

Also, Robert Lloyd, former president of Advanced Memory Systems; Frederick Scherer, an economist, James E. McLinden of Chase Manhattan Bank; Arthur A. Collins, president of Collins Radio; and Lester Kilpatrick, chairman of the board of Calcomp, whose testimony from the recently ended Calcomp vs. IBM trial will be entered into the record.

The government started its case with a witness list of 107 names; that list has been reduced almost by half through deletions, and approximately 43 have testified.

Large and Entry-Level Systems Extend CDC Cyber 170 Family

(Continued from Page 1)

scheduled to begin in the fourth quarter of this year.

A typical entry-level Cyber 171 costs approximately $19,700/mo on a five-year lease. The price includes all hardware, software and maintenance charges, the firm said. The purchase price is under $800,000.

A basic Cyber 176 costs approximately $150,000/mo on a five-year lease.

With 192K words of main memory, 512K words of extended memory and a complement of various disk, tape, printer and card equipment capable of supporting batch processing, the 176 sells for under $7 million.

171 Features

The Cyber 171 features a host CPU with a 500 nsec major cycle time; a second processor is optional. The processors utilize emitter-coupled logic integrated circuits, the firm said.

The CPU is structured around 24 operating registers. Eight 60-bit operand registers are complemented by eight 18-bit address and eight 18-bit increment registers.

Each CPU also contains both a large and small arithmetic section, a spokesman added.

The peripheral processing subsystem allows the user a choice of 10, 14, 17 or 20 peripheral processors. Each processor has semiconductor memory of 1K 12-bit words; each word has an odd parity bit, he noted.

The subsystem utilizes either 12 or 24 I/O channels that are common to all processors. Each channel has a maximum transfer rate of 2 mHz and all channels can be active simultaneously, CDC said.

Each of the peripheral processors has a major cycle time of 500 nsec, according to the spokesman.

Memory Options

Five MOS semiconductor memory options ranging from 64K to 256K words are available, CDC noted. Memory is organized in independent banks of words with corresponding multiphasing of eight to 16 banks.

The central memory cycle time is 400 nsec for each bank. The banks are phased so successive addresses are in different banks, permitting operation at speeds faster than the basic cycle time, he explained.

Memory transfer rate is one 60-bit word or 10 characters per 50 nsec, he added.

An optional extended core storage subsystem consists of extended core storage, a controller and one or more distributive data paths. The paths attach to the I/O channels.

After the initial access, extended core storage can transfer at the rate of 10 characters per 100 nsec. It provides a maximum rate of 100M char./sec, CDC claimed.

Extended core storage is available in sizes ranging from 2.6 million character words (two banks) to 20 million words (16 banks).

176 Features

The Cyber 176 is a multipurpose system said to be 3.5 to 4 times more powerful than the IBM 370/168. It provides real-time/-time-critical network, commercial, data management and scientific capabilities, CDC said.

The CPU for the 176 consists of nine independent functional units. Its instruction stack holds up to 48 instructions.

Like the Cyber 171, the 176's CPU utilizes 24 operating, eight 60-bit operand, eight 8-bit address and eight 18-bit increment registers, a spokesman noted.

Central memory options of 131K, 196K or 262K 60-bit words of bipolar semiconductor memory are offered. The memory has a transfer rate of one 60-bit word per 27.5 nsec, CDC said.

Single-error correction/double-error detection logic is inherent with the system, it added.

Direct Access

Extended memory options include 512K, 1M or 2M 60-bit words. Bandwidths to or from central memory are either 18M- or 36M word/sec and memories are capable of direct access to and from the CPU operand registers, the spokesman said.

I/O Subsystem

The Cyber 176 I/O subsystem centers around an I/O multiplexer with 180M char./sec total bandwidth. It offers one or two 60-bit ports for Cyber 170 peripheral processor systems.

It also features four to 14 12-bit data channels for high-speed peripherals and a CPU interrupt system, the spokesman added.

Eight Channels

The high-speed peripheral processor has a 27.5 nsec cycle time. It also has eight full-duplex I/O channels per processor. Memory consists of 4K 12-bit words plus one parity bit per word.

Instructions are issued from the 176's stack at a maximum rate of one every system clock period (27.5 nsec). Each of the nine functional units receiving the instruction is independent of the others, permitting parallelism of operation to occur, CDC claimed.

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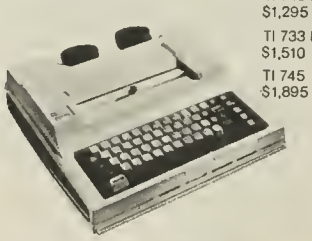

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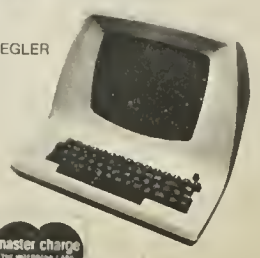

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UNIQUE SYSTEMS

The Computer Caravan made its first stop in San Francisco last Tuesday during a week designated by Mayor George Moscone as 'Computer Week.' Some scenes: Crowd studies Epic Data Corp. display (right); curious onlookers gaze at Qume Sprint printer (far right); and Ken Harms (bottom), who gave some pointers on how to set up a system (see story below).

CW Photos

Advice for Potential Users

Pop the Questions Before Wedding System: Harms

By Toni Wiseman
Of the CW Staff

SAN FRANCISCO — Despite a widespread fascination with whistles and bells, a computer may not be the best way for a company to go, attendees of the Computer Caravan were told here last week.

But if computerization is the answer, there are still many questions to be asked, according to Ken Harms, deputy associate laboratory director of administration at the Far West Laboratory for Educational Research and Development.

When Harms was hired in 1973 to install a new financial information system for the lab, his bias was definitely pro service bureau, he said, having worked for a small company which successfully used a bureau and for another which had finally thrown out its 360/40 and changed to a service bureau.

Despite his bias, Harms took a careful look at his users and their needs and then drew up objectives for the new system. These included relevancy, credibility, readability, accuracy, simplicity, flexibility and cost effectiveness — criteria applicable to almost any user's system.

The reports, for instance, had to be timely and as frequent as the users needed. They also had to meet established criteria of credibility and data had to be consistent, he said. In addition, all reports were to include both codes and English labels.

Based on these objectives and a familiarity with the tasks to be performed, Harms said he was able to begin design of the system.

Harms indicated three tiers of activity have to be considered before a system can go up: programming, installation and operation.

Will the programming be done in-house or will software be purchased? he asked. "All other decisions are based on this one.

"You have to be software-oriented because if you are going to buy your software, you're going to buy a machine that package will sit on," he told workshop attendees.

Secondly, who is going to install the system? The answers range from the user himself to a turnkey house, Harms indicated.

"A turnkey system is very economical if it works, but that's where the problem comes in; it doesn't always work," he warned.

Finally, the user has to handle the third or operational tier. This covers four basic areas or options: facilities management, service bureaus, time-sharing service bureaus or an in-house computer.

Chose In-House Route

"After doing the initial specifications, it became evident that if I didn't go to facilities management, I had to have a professional staff.

"However, if I had a staff to do my programming, I'd have a staff afterwards too, and that was going to be expensive," Harms said.

Therefore, Far West decided that if it chose in-house programming, it would hire only one permanent staff member — the DP manager — and all others would be temporary, he said.

After developing a preliminary system description of about 100 pages, Harms approached representatives of the four operational options.

The facilities management people were very helpful, while the time-sharing people were looking out for their own needs and not the user's, he said.

"Their frame of reference didn't mesh with ours," he added, noting a firm which had originally quoted a price of $750/mo had upped it to $6,000 by the time it actually studied the specs and bid.

"Computer manufacturers were simply speaking another language," he said.

It is essential to be able to "translate" the vendor's language, Harms added. If a vendor tells you about the Rumanian payroll application he set up, it may be because it's the only system he has up.

When he brags about interfacing with any number of peripheral manufacturers, that can often be translated to mean he does not manufacture or support any peripherals.

The decision was made to go in-house for financial reasons, Harms said. "Facilities management came close, but was a trifle more expensive," he noted.

Harms finally settled on a Varian Data Machines V76 system operating under the Vortex II operating system. But, the computer selection did not go into the hardware specifications because "I didn't care what we used to get the job done as long as it filled the users' needs," he said.

Preliminary Questions

Harms offered the attendees a host of questions which should be asked before installing a machine, however.

In terms of languages, will it lock you into one computer or will you be able to change vendors?

Questions about the operating system are also very important, he said.

"Memory is getting cheap, but it's still an important question. You don't want to buy a 64K mini and an operating system only to find out later that the operating system takes 50K," he said.

A user should also ask how many releases of the system there are. If the last release was in 1973, it probably means they no longer support it; but if there are releases every month, it probably means its "buggy," he said.

Other essential questions include: Do the diagnostics explain what is wrong? How good are the manuals? Does the system grow? Can you add disks? Memory? Terminals?

Finally, there is the all-important site visit, Harms said.

The most important thing you can learn here is the DP manager's name and phone number "so you can call him later and talk without the influence of the salesman."

Computers Now Treated Better?

(Continued from Page 1)

"Certain areas of computer science, including software engineering, are so volatile, it is essential to make some effort to remain aware of current developments. The leading software engineering journal has only been in existence for two years," he noted.

Without some incentive to remain abreast of new developments, many employees will develop intellectual stagnation and cease to be effective, he warned.

Some significant advances have been made with respect to understanding of software development practices during the past five years, yet "the vast majority of programmers" have had little or no exposure to these concepts, he said.

Getting down to specifics, Wasserman said many programmers may have heard of structured programming, "but have learned about it only in the context of a set of rules or coding practices," without having gained an understanding of the motivation for its use or its relationship to the overall practice of software development.

"The key notions of design and verification [which Wasserman discussed in detail early in his talk] are simply unfamiliar to most programmers," he said, adding however, "there is every indication that employees are anxious to gain this type of knowledge."

"They are appreciative of employers who provide it for them," he continued. The general reaction to industrial professional development programs "has been overwhelmingly favorable."

Seminars Generally Appreciated

Management and staff alike generally find the time and money spent bringing outsiders in for seminars or short courses have been well spent.

In addition to providing some new ideas to professional employees, he explained, "such educational efforts raise morale, with a tendency to improve the quality and quantity of work" apart from gains made by using the newly learned concepts.

One of the most common objections to having regular courses or seminars is that they take time away from more pressing activities, Wasserman said.

"However, if such a professional development effort results in even a 5% improvement in effectiveness or in one imaginative solution to an existing problem, the investment can be recovered in a very short period," he added.

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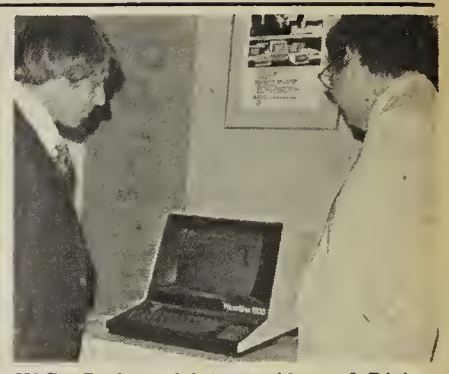
CW Photos by R. Frank, J. Hebert

Robin Anderson (left), systems project manager for Woodward Stores, Ltd., gets a demonstration of Raytheon's packet-switched software.

Attendees crowd booths on exhibit floor.



W.S. Conley (right), president of Digitex Corp., examines the newly introduced Hazeltine 1500.

Raytheon X.25 CRT Among Show Debuts

(Continued from Page 1)

Motors Corp.

The Paradyne system reportedly requires no implementation of either IBM's Virtual Telecommunications Access Method or Network Control Program.

At the show, the PIX II system operated under full-duplex Synchronous Data Link Control (SDLC) at speeds up to 56 kbit/-sec. It includes two controllers, one of which is a local control unit that directly connects to an IBM 360/370 interfacing with the byte multiplexer channel. The other processor is a remote control unit which supports peripheral devices.

Data transmitted from a CPU to a PIX II is stored in memory one byte at a time until an SDLC frame has been accumulated, Paradyne explained. The data is compressed with each device buffer-tagged with an address and transmitted to a remote control unit and then to the attached peripheral devices, the vendor said.

PIX II eliminates the formatting and error-recovery overhead burdens associated with teleprocessing systems, the company said. Prices for the basic Virtual Data Link System begin at $800/mo.

Paradyne also showed its SRM-192 short-range modem, a limited-distance device that operates at speeds up to 19.2 kbit/sec with terminals located up to 18 miles from the CPU. The unit costs $25/mo or $900.

Hazeltine Introduction

Hazeltine Corp., Greenlawn, N.Y., introduced the 1500 CRT which uses microprocessor architecture to offer buffer and editing features. The terminal includes a numeric cluster, cursor addressing, printer interface and upper/lower case printing; it can operate at speeds up to 19.2 kbit/sec, the company said.

The CRT has a purchase price tag of $1,125.

Hazeltine also introduced mainframe protocol compatibility to allow the use of its Modular One terminal with Burroughs, Honeywell and Univac machines. Typical prices are $96/mo on a three-year lease or $2,250 to purchase.

In addition, the company announced reductions of up to 35% on its Hazeltine 2000 CRT. The price of the unit was reduced from $2,995 to $1,950.

Gandalf Data, Inc. introduced its LDM 404 limited-distance modem which is said to operate in full-duplex mode over four-wire metallic circuits at distances up to 20 miles. The unit transmits at 4,800 bit/sec and costs $1,500.

Southern Pacific Communications (SPC) announced it is offering the Switched Digital Datadial Service previously offered by the now-defunct Data Transmission Co. (Datran). The service utilizes the same digital switch built by Datran, an SPC spokesman said.

Universal Data Systems, Huntsville, Ala., showed its Comtest test set that can monitor, transmit and receive data as well as emulate a remote terminal. The microprocessor-based unit can operate in full- or half-duplex mode and emulate either CPU or terminal devices.

The test set costs $7,950, the vendor said.

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Fred Babb of the Zale Corporation in Dallas, Texas says it this way: " Not only am I pleased with your products but the people who use them are pleased. They particularly like the non-glare screen of the G77. We have both terminals and printers, and on the rare occasions we have needed service it was excellent." And from Robert Niebanck of Merrill Lynch Pierce Fenner & Smith in New York City: "Not only are the printers 2 to 2½ times faster, but they are costing us less. Over the next 4 years we expect to recover a full $227,000." Once you get to know us, you'll love us too. For a demonstration, or more details, send in the coupon. **Genesis One® equipment is sold and serviced in Canada, Western Europe and Australia by MAI International Corporation.**

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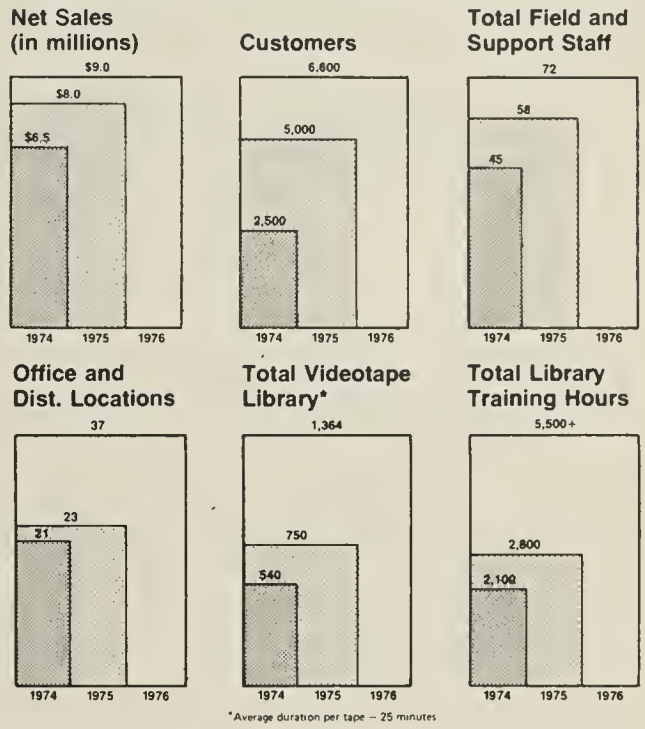
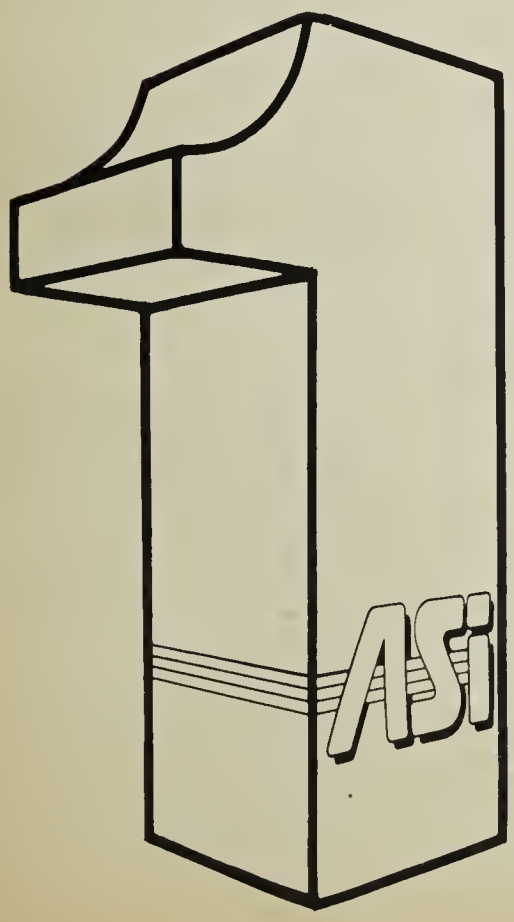


*Average duration per tape – 25 minutes



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Service, Cost Structure Changes Seen

Bell Predicted Switching From Reaction to Innovation

By John P. Hebert
Of the CW Staff

ATLANTA — Until very recently, AT&T has reacted to the communications innovations of others rather than being the initial developer of new services, but that's going to change, according to a speaker at Interface '77 here last week.

In the area of data communications, Bell has had little competition from any other specialized common carrier; with the advent of the all-digital services that will be provided by Satellite Business Systems, however, Bell is lauching a counter-attack, Anthony T. Easton said at a session on "Bell Services."

The communications consultant with International Communications Management of San Francisco gave session attendees a glimpse of Bell's service offerings and changes in cost structures which will affect uses in the near future.

"What can Bell do to respond to innovations by others?" Easton queried.

These innovations include circuit monitoring; shared multiuser network switches; running voice and data communications over the same line in piggyback fashion; and other services which Bell doesn't provide, including an all-digital switched network and quantity discounts.

CW at Interface '77

Bell has already begun to counter these trends by increasing local-loop costs and lowering the charges for long-haul communications to compete with the other specialized common carriers, Easton said.

Bell will continue on that tack, but will also implement a number of other changes that will affect users, he said.

Among the list of changes Easton predicted for the next three to five years were:

- Bell will open up leased-line sharing.
- Series 1000 channel prices will continue to rise while the 3000 series of lines will continue to drop and eventually become cheaper in the long run.
- Bell will introduce its own switched data network, but it won't be compatible with the new CCITT X.25 protocol.
- Bell's Wats service will be substantially restructured — becoming a three-zone service effective July 1977, rather than the five-band service presently offered.
- In-Wats service will become more costly and Out-Wats service costs will be lowered.
- Satellite circuits will be sold on a limited basis.
- Bell will offer direct dialing on its Dataphone Digital Service.
- Private lines will become usage-sensitive rather than time sensitive.
- Bell will introduce a six-second billing minimum on Direct Distance Dial (DDD) lines because of the installation of up-to-date switching equipment.

In addition, Easton predicted that within the next three years Bell will be in a good position to put intelligence into the public network along with queueing facilities.

It will not be easy for communications managers to cope with the new services and constantly changing prices, Easton said, but it will be more advantageous to use the DDD switched network rather than leased lines.

In addition, tariff modifications on an intrastate basis will cause frustration because users, in more and more states in the future, will be charged every time they pick up the phone, he concluded.

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Good Relations Key To Good Service

ATLANTA — While some speakers had few good things to say about the services or corporate strategy of AT&T at last week's Interface '77 data communications conference here, a user from the American Broadcasting Co. (ABC) did lend Bell some support.

William B. Rogers, ABC's manager of data communictions, said users could get good service from Bell with attempts at good human relations.

"If we can get the information to Bell on time about the problems we have with our installations," then Bell can start working on it quickly.

"Repair, however, is the problem," Rogers told attendees of an Interface session on "Bell Services."

Rogers urged users to make as complete a diagnosis of the problem as possible before calling Bell and to write down the findings of any system tests performed.

Know the circuit number, he suggested, adding it is a little thing, but "you have to give them a break and then push them.

"Make them come to a meeting and ask them there why they can't solve your problems," he said. "Stand in their shoes, see the action on their turf and show them you're interested."

Relations, he said, are a two-way street, and without it users will not get the full service Bell can offer.

London Seminar Planned On DP Personnel Topics

LONDON — The power of trade unions, pay restraints, increasing legislation and how they all make it difficult for managers to retain DP personnel will be the focus of a one-day seminar here entitled "DP People in a Changing World."

BIS Applied Systems, Ltd. has assembled a team of speakers to discuss these issues on April 20 at the Carlton Tower Hotel.

Specific topics will incude the role of government, the role of training and the problems of salaries and motivations.

The conference fee is approximately $150 plus tax. For additional information, contact R.B. Yearsely at BIS Applied Systems Ltd., 79-80 Blackfriars Road, London SE1 8HB, England.

Wirth Calls Bell Bill Dead, But Says Issues Still Alive

By John P. Hebert
Of the CW Staff

ATLANTA — The Consumer Communications Reform Act, known as the "Bell Bill," is dead, in the opinion of Rep. Timothy Wirth, keynote speaker at the Interface '77 data communications conference here last week.

And AT&T's push for the Bell Bill actually is an attempt by its chairman, John D. deButts, to ask for nationalization — not of computers nor of communications, but of "our future and our freedom," Wirth's cospeaker; John Eger, charged.

"The Bell Bill is a blatant piece of special-interest legislation" that has but two sponsors out of 16 members on the House Subcommittee on Communications, according to the democratic congressman from Denver.

But if the bill seems destined to die in the 95th Congress, "why then is there no such clamor?" Wirth asked.

"Because the issues raised by the legislative attempt are not going to go away," he said.

"We should give our thanks to Ma Bell for dramatizing the issue — bringing it to light — to see how telecommunications should be structured in the near future," he added.

Older Than It Seems

The Bell Bill, according to Wirth, began long before AT&T started lobbying in 1975 and 1976 and spending $50,000 a week; it began when the Federal Communications Commission (FCC) allowed users to connect their own terminal equipment to AT&T-owned communications lines, the congressman said.

The bill has nothing to do with the consumer's prices being raised by the outside competition in the telecommunications industry, Wirth said, adding the bill would undo everything the FCC has done to promote competition and give telecommunications users the freedom of choice.

The House Subcommittee on Communications found in a recent study that competition, not monopoly, should be the approach to telecommunications, Wirth noted.

The Justice Department said the Communications Act of 1934 provided for competitive entries into the field, rather than monopoly.

"Justice has confirmed the theory of competition over and over and over again," Wirth noted. "It is not just a figment of the imagination of a few in Congress that there should be competition; that's how the Constitution and the Communications Act of 1934" also look at the question.

"This is not rhetoric," he stressed. The Subcommittee on Communications passed a resolution "that competition is the best approach" to meet the rapid change in the industry and to provide for people's needs, he said, quoting from his procompetition document.

'System Equals Solution'

"The [AT&T] lobby intends to engulf us," attorney Eger, a consultant on communications legislation, told the audience.

Bell's advertising campaign to promote its legislative proposal maintains "the system is the solution," Eger said.

"But," he asked, "what system?

"The Bell System, of course," he replied, adding further the questions, "A solution to what?" and "For whom? — Bell or us?"

Although the number of those supporting the Bell Bill has dropped from 227 during the 94th Congress to between 60 and 70 during the 95th, the telecommunications industry — and therefore the computer industry — has a dilemma, the Washington lawyer said.

That dilemma concerns more than just the Bell System; it concerns freedom and the future of telecommunications, according to Eger, who was acting director of the White House Office of Telecommunications Policy.

AT&T operates under "a pervasive scheme of regulation that is over 40 years old," he said, referring to the 1934 Communications Act.

The telecommunications industry needs less regulation and more competition, Eger continued.

In the short history of telecommunications, competition has been shown to be the best approach for the consumer and for the Bell System, he said.

John deButts is "dead wrong" in his philosophy of regulation being better than competition, Eger said, adding he was talking "about the future."

The Bell Bill, he said, will not pass this year. But next year or the year after, Bell, with all of its resources, will get a bill through eventually.

"It's a bad bill, a backward bill, and we must never let it pass," Eger contended.

The bill would allow each state to decide the conditions under which terminal equipment can be connected to the phone network, who will supply it and how it should be designed and implemented for attachment. "It would provide for total elimination, in my opinion, of all competition in the future," he said.

CW at Interface '77

Computers and telecommunications are the greatest national resource and Bell seeks to control it, Eger said.

The Reform Act is an anticonsumer bill; the consumer aspect, he said, is a "scare tactic."

Benign Neglect

Although the Bell System is the best communications network in the world, Bell management is slow to change and slow to adjust to its consumers' needs. "It has the attitude of benign neglect — which is that of a regulated monopoly," Eger said.

Eger called for communications users and vendors to help determine what telecommunications will be like in America's third century.

"We can't wait for the government to resolve its antitrust suit with AT&T and we can't wait for Bell to shape the minds of a future generation that the 'system is the answer' with its 'consumer bill,' " he said.

In his closing remarks, Wirth summed what he and Eger had said by noting there are "precious few in Congress who have [more than] a passing knowledge of what the Bell Bill and the communications industry are all about."

He urged interface attendees to "register your thoughts...so we can see a fair and expeditious rewrite of the Communications Act of 1934."

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Private-Sector Privacy Rules May Limit Data Collection

By Nancy French
Of the CW Staff

WASHINGTON, D.C. — If made law by Congress, the Privacy Protection Study Commission's recommendations for fair information practices in the private sector would change not only the way organizations disseminate and maintain data, but also what information can be gathered and how.

The commission, established by the Privacy Act of 1974 to study and recommend legislative measures to protect individuals' personal records maintained in the private sector, will publish the results of its work in June.

In a recent interview, David Linowes, commission chairman, described what the recommendations will contain.

All recordkeepers would be seen as owing a duty of confidentiality to those whose records they maintain, and all data subjects would have the right to see, copy and correct their records, Linowes said.

However, specific industries would be required to meet standards of record protection particular to the records they collect and maintain, he noted.

Open-ended authorizations demanded of the insurance or job applicant allowing unlimited access to his records will disappear and in their place will appear authorizations that give a particular company access to an individual's records for a specific, limited period of time, like 90 days, Linowes said.

The practice of maintaining and then basing insurance decisions on health information from sources such as neighbors rather than qualified medical authorities would also be outlawed, Linowes indicated.

In addition, insurance companies would be required to delete from records data "not within the scope of information" the individual was originally told would be collected about him — an idea not found in previous legislation.

The company would not necessarily have to contact every organization that received the incorrect information, however — only those companies specified by the individual, Linowes said.

All insurance institutions and insurance support organizations which prepare investigative consumer reports on individuals will be required to interview those individuals as part of their reports unless an individual waives the interview. This would not apply in cases where a civil or criminal action was anticipated or in cases where a claim was being settled, Linowes said.

The commission will recommend further that when an insurance institution or a credit grantor makes an adverse decision, it must tell the individual why — if he asks — and it must be done in writing and in a form the individual can comprehend.

This would include all the specific items of information obtained from consumer reporting agencies which support the reasons given for that decision, he indicated.

In all cases, companies would be permitted to charge a fee for copies provided.

Prior to collecting information about an individual from another person in connection with an insurance, credit or job application, the company must tell the data subject what types of information will be collected about him, including that dealing with character and general reputation.

In addition, the applicant should know the techniques that may be used to collect such information, the types of parties who may be asked to provide it and also how he can see, correct or dispute any resulting information collected.

The individual must also be told that information will be retained and subsequently disclosed to others.

The commission will also suggest that Congress consider establishing or investing in an existing agency the responsibility for deciding just what information is relevant.

However, Congress will have to decide how to do this as well as decide what a credit reporting agency or credit grantor would have to do with information it already has that has been deemed "irrelevant."

The commission will recommend that individuals, upon request, have a right to see, copy or correct records maintained by a health care provider. This could be either directly or through a licensed health care professional, Linowes said.

The commission will recommend that employers make a distinction between employee records which an employee would be allowed to see and copy on request and those that would be considered "management records," Linowes said.

However, employers should not consider as management records the information they collect on an individual's performance, potential or his medical or insurance records or information collected from credit reporting agencies in the course of an employment decision.

Upon request, an employee, former employee or applicant should be entitled to see, copy and correct such records. In cases of disputes, the individual can file a statement that would be maintained with that record.

The same would apply to medical or insurance records maintained by the employer.

Unless specifically required by law, an employer should not obtain or use an arrest record pertaining to an individual applicant. No employer should be required to obtain an arrest record for use in an employment decision if it is more than one year old and has not resulted in a disposition, Linowes said.

The commission will also suggest that Justice Department regulations be amended to require federal or state criminal justice agencies that maintain criminal records to disclose only the information an employer is lawfully required to obtain in connection with preemployment inquiries.

At present, busy law enforcement agencies often provide an entire rap sheet, with or without dispositions.

This recommendation is not intended to interfere with an employer's access to indictments, Linowes indicated.

Finally, unless otherwise required by law, an employer should obtain or use a conviction record only when the record is directly relevant to a specific employment decision and should destroy that record after the decision is made.

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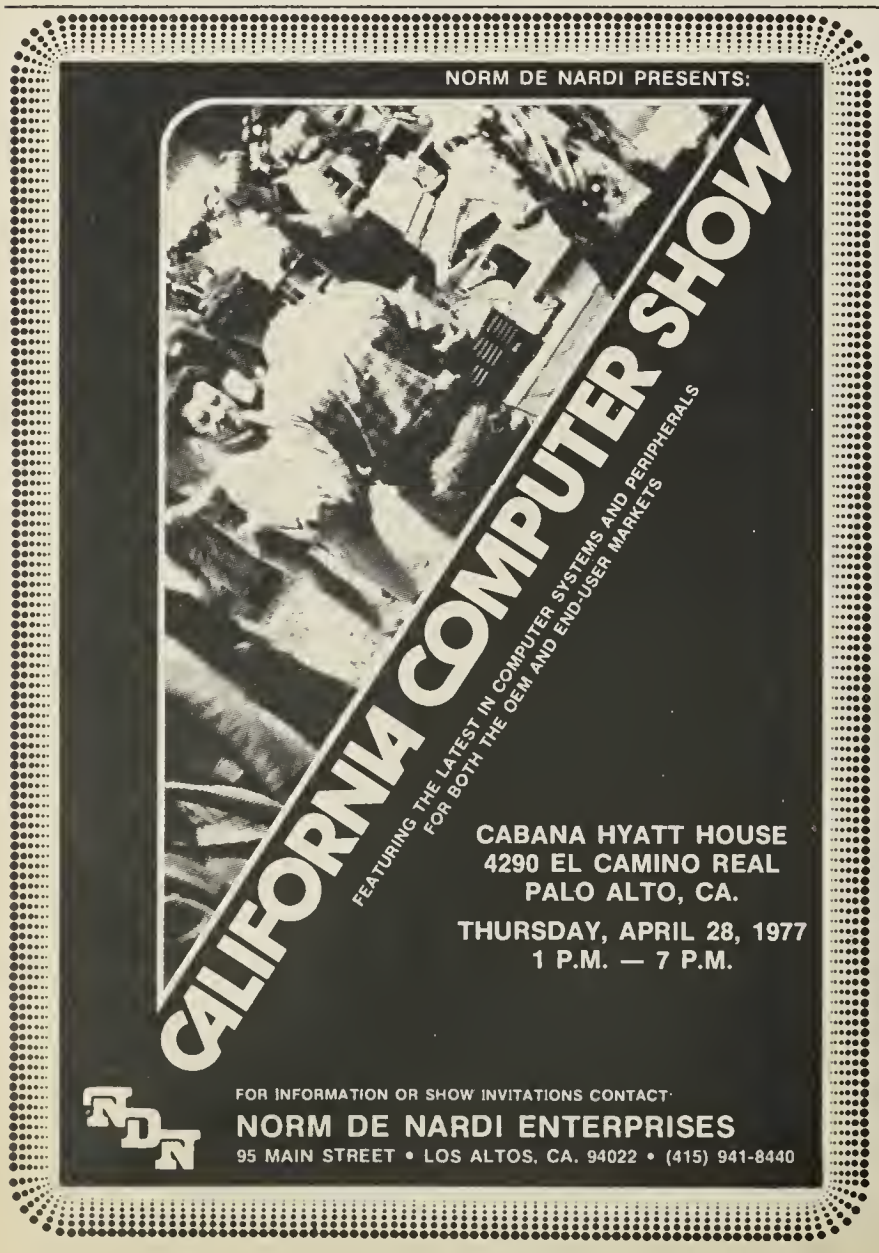

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When It Makes June Recommendations

Commission to Urge Industry-Specific Privacy Laws

By Nancy French
Of the CW Staff

WASHINGTON, D.C. — When the Privacy Protection Study Commission issues its recommendations for privacy standards for private-sector recordkeepers this June, it will not be recommending an omnibus privacy law that applies uniformly to all businesses, according to David Linowes, the commission's chairman.

While the basic rights to see, copy and correct personal records wherever they are maintained should apply to every form of data — from credit records to psychiatric files — the way in which those rights are to be implemented should vary considerably, Linowes explained in a recent interview.

Consequently, the commission will publish one volume of general recommendations followed by a series of additional volumes that are specific to each type of personal recordkeeper studied by the commission during its two-year assignment.

The recommendations will be turned over to the President and Congress in June. At that time, they will probably be given to committees whose jurisdiction specifically extends to a particular business area, he explained.

Some privacy rules might be enacted as amendments to existing laws, such as the Fair Credit Reporting Act, that already provide privacy safeguards for individuals' credit records, he indicated.

On the other hand, recommendations that apply to the insurance industry or the medical community, for example, would be handled by committees that might prefer to enact new laws.

Other Suggestions

While this could dilute the privacy effort, the legislation that results will be specific to each type of recordkeeper, Linowes said.

In the case of disputed information, the individual should be able to file a statement that must be provided to all who access that record in the future, the commission will recommend.

The commission also will call for all recordkeepers to have reasonable procedures for assuring the accuracy, completeness and timeliness of information they collect, maintain or disclose about an individual.

In no case will the commission recommend that businesses provide information to individuals whose records they maintain unless the individual formally requests it — by phone, mail or in person, Linowes indicated. For example, if an individual is refused an insurance policy, the company must tell the individual why — but only if he asks.

Strict But 'Do-Able'

The recommendations are strict, but all are "do-able and not burdensome, and none is unrealistic or unreasonable in terms of economic costs," Linowes said.

An individual's right to see, copy and correct records runs through every recordkeeping area, he noted.

The recommendations also will call for "relevancy standards" for information collected. However, they will not specify who should set up those standards, nor do they call for a regulatory commission per se, he said.

CW Photo by N. French

David Linowes

"We tried to show Congress the means by which it can effect these regulations without building more bureaucracy. We're already overregulated and overlegislated, but having said all of this, we do feel there should be an ongoing monitoring," he said.

Those who had hoped the commission would resolve the issue of who actually owns data — the data collector or the person to whom the data applies — will be disappointed.

The commission's recommendations speak in terms of "right or claim" to information, Linowes said. "We haven't used the word 'ownership'" because it's too absolute and "there aren't very many absolutes in our society," he explained.

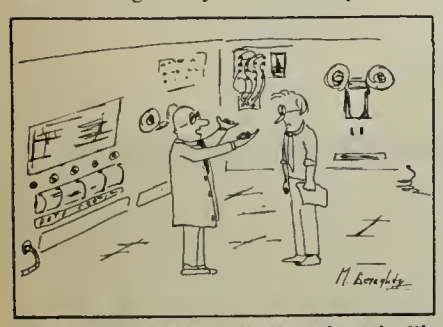
He did point out, however, that until now ownership of the personal records in the private sector have always been the exclusive property of the collecting organization. It did whatever it wanted with them and put in anything it wanted.

"These recommendations will whittle away rather drastically at that right," he said.

Destruction of records is just as critical as relevancy standards, he said. The fewer records organizations keep, the fewer they must safeguard, he said.

Many organizations that had destruction policies before the advent of the computer have given up that policy. One witness told the commission his firm had been using a computer for a reservation system for three years and in that time never destroyed a single record.

"Prior to the computer, the company destroyed those records every 90 days. It's cheaper to store information in a data bank than to destroy it because destroying it takes computer time," he noted.



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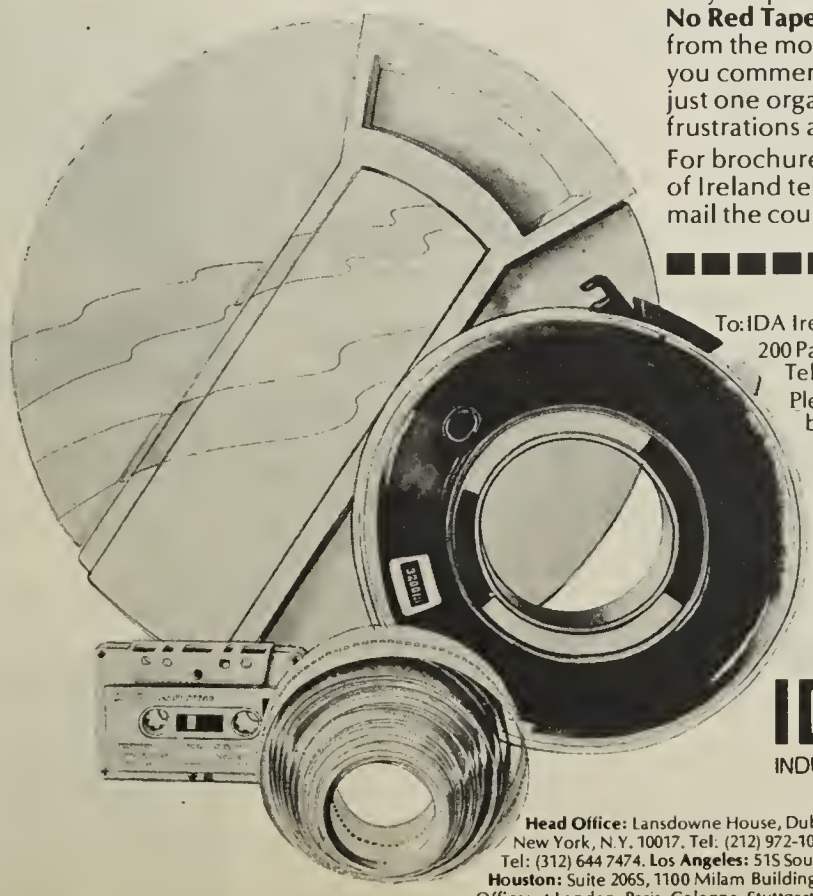

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CPU May Understand English

HANOVER, N.H. — A research project aimed at developing techniques that allow English to be understood by computers is under way here.

Under a grant from the Office of Naval Research, Larry R. Harris, assistant professor of mathematics at Dartmouth College, has developed an English language query facility for use with data base management systems.

The project is aimed at enabling the occasional user who "doesn't want to and shouldn't have to" learn a computer language to benefit from the resources of computers, Harris explained, adding it is by no means an attempt to use English as a procedural language for computer programming.

An example of the level of difficulty with which his techniques can deal, Harris said is a request such as, "Give me a report, broken down by job, of the salaries of all employees earning $15,000 or more, including their name, age and office phone number."

Several time-sharing companies that offer data base management services are currently testing these techniques for possible incorporation into their product lines.

Nationwide Data Base to Help Firms Locate Handicapped People for Jobs

By Toni Wiseman
Of the CW Staff

NEW YORK — A "personalized " service to help the handicapped get back into the mainstream of life will soon be operational here.

The project, a joint venture by Mainstream, Inc. and Information Science, Inc. (ISI), includes the design and development of a nationwide data information system to assist the business community in identifying and recruiting handicapped people who are employable.

Rather than maintaining the names of handicapped individuals, the system will track the various agencies that service the handicapped.

"The title of this encompassing effort is 'Hire,' which stands for Handicapped Information Resource for Employment," according to Harold Krents, Mainstream's founder and legal counsel. Mainstream is a nonprofit organization which aids industry in its effort to locate qualified handicapped employees.

Federal Compliance

"The fact is that hiring the handicapped must now be based on a whole lot more than sympathy and do-goodism. Approximately 1,900 complaints were filed by the end of 1976 under the 1973 Rehabilitation Act," which relates to the handicapped as the Civil Right Act of 1964 does to women and minorities, Krents said.

The act specifically requires any contractor or subcontractor doing more than $2,500 in business annually with the federal government to have an Affirmative Action program for the handicapped.

The Rehabilitation Act defines a handicapped individual as a person with a physical or mental impairment that substantialy limits one or more major-life activities.

The federal law not only prohibits companies from discriminating against the handicapped, but states they must provide them with regular life insurance and hospitalization benefits.

Cross-Referenced Agencies

The Hire data base will fully describe and cross-reference the thousands of agencies concerned with the handicapped, according to Dale Learn, president of ISI, a human resources software firm that will maintain the system.

Although about 20,000 agencies across the U.S. service the handicapped — including sheltered workshops, vocational rehabilitation centers, employment security organizations, state education offices, consumer groups and labor organizations — companies currently do not know where to begin to find the individuals they need to comply with the federal law.

The data base, in addition to providing the names of agencies, will tell the employer if that agency will train the individual or if he will have to take someone with general skills who will need more training.

It will also indicate whether, for instance, the agency will pay for a talking calculator for a blind employee or whether the firm will have to provide it and whether the agency provides transportation or other services for the handicapped it serves.

The data base will be compiled on ISI's IBM 360/65 and updated as agencies inform ISI of changes. A firm will then be able to contact the computer center in Montvale, N.J., and a search will be performed to select the nonprofit agencies in the firm's vicinity which can best fill its needs for handicapped workers qualified to perform particular jobs.

Initially the data base will contain names of agencies in New York City. The service will then be enlarged to a 50-city network and finally expanded to cover the entire country.

Learn estimated it will take 24 months to get the data base fully operational.

CDP Qualifying Exam Slated for Military

CHICAGO — The Certificate in Data Processing (CDP) examination will be offered in 857 U.S. military installations throughout the world beginning with the February 1978 sitting.

The exam will be made available to military candidates under the same conditions and requirements that apply to civilian candidates through an agreement between the Institute for Certification of Computer Professionals (ICCP) and the Defense Activity for Non-traditional Education Support organization known as (Dantes).

Additional information is available from the ICCP at 35 E. Wacker Drive, Chicago, Ill. 60601.

DP Flea Mart Set

CLEVELAND — Hobbyists who delight in buying, selling and trading computer equipment will have the opportunity to bargain hunt at a flea market to be held at Computerfest '77, the second annual computer conference for hobbyist computing.

Sponsored by the Midwest Affiliation of Computer Clubs (Macc), the convention will be held on June 10 at the Bond Court Hotel here.

In addition to the flea market, Computerfest '77 will feature workshops, manufacturers' exhibits, seminars and technical sessions open to all attendees.

Additional details are available from Gary Coleman at Macc, P.O. Box 83, Cleveland, Ohio 44141.

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IBM Called Exception

DP Industry Hit for Attitude on Handicapped

By Toni Wiseman
Of the CW Staff

WASHINGTON, D.C. — With one exception, the DP industry — both users and manufacturers — has done very little in the area of employing the handicapped, a lawyer charged here recently.

Harold E. Krents, blind since birth and the man whose life was the inspiration for "Butterflies Are Free," is a leading authority on the Rehabilitation Act of 1973. This law requires all companies with annual government contracts of $2,500 or more to take affirmative action in hiring handicapped and disabled workers.

IBM has been "in the forefront" almost from its inception as an employer of the handicapped, Krents said. "Long before there was a law on the books, IBM had taken a very strong position," he noted.

Unfortunately, beyond IBM and now Fairchild, the DP industry as a whole has lagged, he stated.

In fact, he said, "in the case of some computer companies there's been an almost negative reaction, a feeling of 'I'm not going to do anything until the government forces me to.' "

This is unfortunate because the computer is generally seen by the public as a "very impersonal, Big Brother thing, and here is an area where the companies could show that in fact computer companies do care about people as well," he stated.

One problem which crops up is that companies who are willing to comply with the federal law do not know where to find good, motivated people, he said.

"You can't find handicapped people in the traditional places . . . Employment agencies don't have the handicapped, they just don't go through that channel.

"And the handicapped have been so pushed around that they don't tend to come out looking anymore. You have to go and find them," Krents said, noting that he himself, although an honors graduate of Harvard Law School, had been turned down by 40 firms because of his disability.

Disability a Plus

In many cases, however, it is the disability which makes the handicapped person suited to a job, Krents said. A deaf person, for instance, was the ideal solution to one company's noise problem in its bursting room. The operator was trained to do the job and the firm saved the cost of installing soundproofing.

Deaf people are also less distracted by other noises and have been shown to have a higher programming output than programmers whose hearing is unimpaired, he noted.

"There are all sorts of commonsense areas where the handicapped can be employed: the paraplegic in the reception area, the mentally retarded in repetitious jobs, and so on. And with the special aids available today, such as Braille terminals and talking terminals, there is no end to the opportunities for users and manufacturers," he said.

"But there is a specific requirement in the law that the handicapped also be hired in the management area, and more and more handicapped people are going through colleges and universities and graduate schools. This is going to be a very large source for the computer community."

"Generally, among the computer manufacturers the response I have run into in my travels for Mainstream [see related story on Page 14] has not been an enthusiastic one," Krents said. One of the "giants" flatly said, " 'I'm not going to do anything until the government puts my feet to the fire.'

"I was surprised. I thought the computer manufacturers would perhaps see the handicapped as a very strong potential. Given the reaction I got at IBM, I thought maybe it had been a bellwether for the industry. It has not," he said.

Harold E. Krents

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Editorials

A Joint Effort

It's been a long time, but it appears that an I/O channel interface standard is finally a real possibility.

The standard would have been more meaningful when first proposed seven years ago, but it will still be an aid to users and equipment makers alike.

More importantly, however, the coming standard illustrates that users and concerned vendors can get together to push for standards for their common good — a lesson better learned late rather than not at all.

The proposed I/O interface standard will permit users to attach independent gear to their mainframes, thus reducing their costs. For the industry, it allows the independents to design peripheral I/O equipment that can be attached to all mainframes, rather than just to the systems of selected mainframers.

Mainframers other than IBM have objected to the present proposed standard [CW, March 28] because it is based strictly on the IBM interface. To some extent, that argument is valid.

The mainframers will now have to either design or buy an interface for their systems that looks like the IBM interface.

It would have been more fair if they could have come up with a proposed standard that would have caused all mainframers to do some redesigning. But that was impossible primarily, it seems, because the manufacturers refused to work together to come up with a forward-looking standard.

So with most mainframers dragging their feet on the issue, a group of users and peripherals manufacturers — spearheaded largely by the Computer & Communications Industry Association — pushed for the standard and have won the early rounds.

The mainframers should realize that this victory will make users and independent manufacturers more confident of their powers in the future and that this group will continue to push for standards in the computer community.

This is a welcome sign. Too often in the past, standards efforts have been subordinated to the marketing needs or whims of the large mainframers.

Because of this, standards are largely nonexistent in the business or so weak they can be ignored with little penalty.

All the mainframers should realize that users and the independent manufacturers are serious now about standardization and there will be more standards in the future.

By constructively joining in the effort, they can make a meaningful contribution.

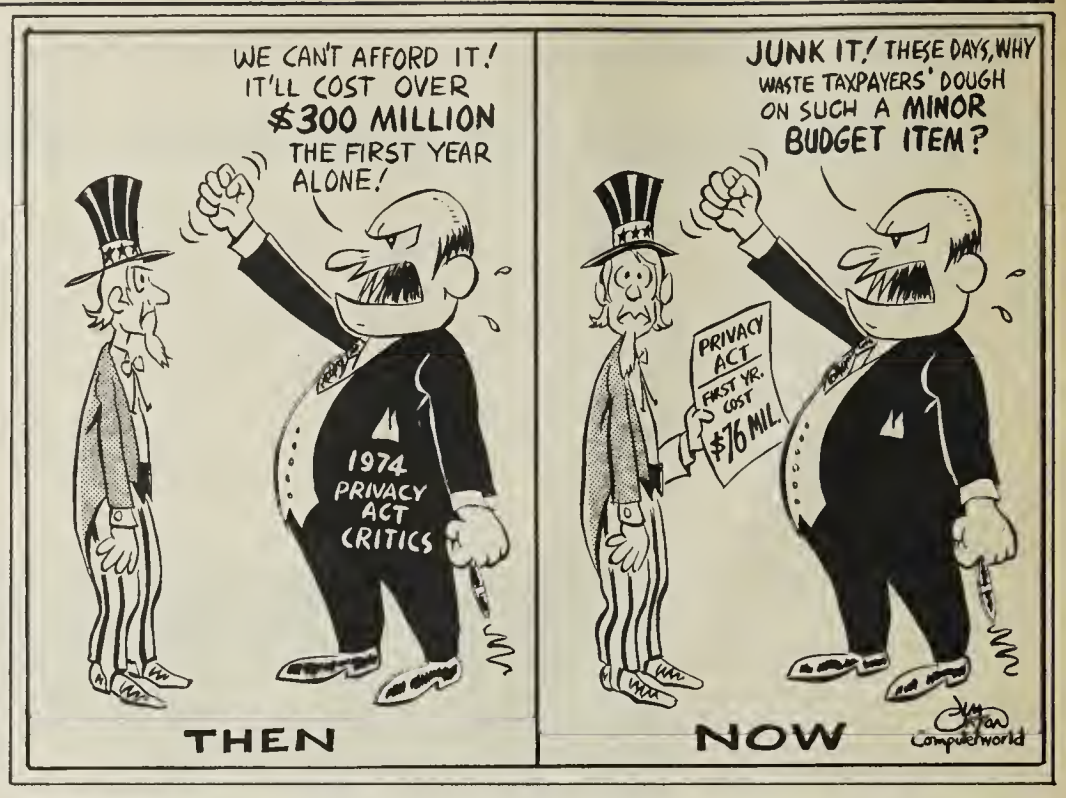
But, if they are unwilling to join constructively then they have little right to criticize the outcome.

We Goofed

Setting up and then operating under the Privacy Act of 1974 last year cost the federal government $66.1 milllon rather than the $36.6 million figure stated in last week's editorial ["Privacy: Exaggerated Costs?"].

However, while the $66.1 million is considerably higher than the amount cited, it came nowhere near the $300 million estimated by the Office of Management and Budget.

Our error gives us another chance to say that privacy is still cheaper than anyone thought — and well worth the cost.



Letters to the Editor

Unhappiness, Not Want Ads, Causes Loyal Employees to Leave

I read with interest Frank Crocitto's letter [CW, March 28] regarding remarks made by Joseph Austin of Dunhill of Worcester, Inc. ["Now's the Time to Dust Off Your Resume," CW, March 14].

Crocitto accused *Computerworld* of "doing a bang-up job for the employment agencies" and further considered the article "an open invitation for even the most loyal systems analyst or programmer to seek new employment."

I am assuming that if Crocitto felt this way then perhaps there are others who agree with him. Austin needs no defense for his remarks. They were quite in order. There are, however, certain points that must be made.

First of all, Crocitto, in his apparent state of paranoia, must consider every want ad section of every major newspaper including CW an open invitation for his loyal employees to leave him.

Secondly, this "invitation" is open to the employees of Crocitto's competitors, some of whom may want to work for him. That should make Crocitto's job easier. Unless he feels that his employees are less happy than those in other companies, I don't see his complaint at all.

Thirdly, CW represents the DP industry. Its commitment is to keep people in that industry informed. There are few things more interesting and, in many cases, more important to people than what kinds of job opportunities are available in their field.

And finally, I must ask Crocitto if he advertises when he is looking to hire someone. If so, is that not an open invitation for the most loyal employee to change jobs and come to work for him?

The fact is that loyal employees (and most are) do not leave their jobs unless they are unhappy.

Robert Litvak
President

Dunhill of Worcester, Inc.
Worcester, Mass

Leave 'Disc' to Discus Thrower

I object to J.D. Crawford's statement that dictionaries prefer "disc" to "disk" ["Disc vs. Disk Controversy: One of Life's Small Wars," CW, March 21].

Webster's New Collegiate Dictionary, which you will agree is a more authoritative source than the *Heritage*, only enters "disc" as a variant of "disk." "Disk" is defined as "a round flat plate coated with a magnetic substance on which data for a computer is stored" (definition 4C).

And for a backup, see the *New York Times Style Book for Writers and Editors*, which lists "disks" and makes no mention at all of "disc."

Can't we leave the "disc" to discus throwers?

Florence Lazar
Copy Editor

Computer Decisions
Rochelle Park, N.J.

Objectives Should Dictate System

I feel that George G. Derry Jr.'s article, "Hospitals Can Achieve 'Spectacular Results' With Shared Systems" [CW, March 21], was misleading.

His per patient-day DP costs are meaningless. Based on his logic, a Datsun is a better car than a Cadillac because its per unit cost is less. Just as this comparison is wrong so is per patient-day DP costs.

The point is: What level of service is the hospital receiving for its cost? This has no relationship to patient-days, but to hospitals' goals and objectives.

I think that the objectives and benefits desired by the hospital should dictate the level of computer technology used.

Michael Lopez

Philadelphia, Pa.

Data Past

Five Years Ago
April 5, 1972

WASHINGTON, D.C. — Before the Supreme Court, Sen. Sam J. Ervin (D-N.C.) charged the Army with being "unwilling or unable" to ensure the complete elimination of information it compiled in its data banks on civilian dissent.

Ervin, arguing in the case of Tatum vs. Laird, charged the Army's data bank operations were "overboard in concept . . . not controlled in operation and provided the military with no assistance of any value to the efficient performance of statutory duties."

— — —

LOS ANGELES — Jerry Neal Schneider, president of a communications equipment firm, pleaded not guilty to charges of stealing nearly $1 million worth of supplies from Pacific Telephone Co.

Eight Years Ago
April 9, 1969

WASHINGTON, D.C. — Savings of almost $10 million per year were predicted from the use of competitive bidding within the General Services Administration (GSA) for the acquisition of maintenance service on its computer equipment, according to a survey completed for the GSA by the Boston Computer Group.

— — —

WASHINGTON, D.C. — The Business Equipment Manufacturers Association (Bema) sent a letter of warning to the Federal Communications Commission (FCC) stating that unless the FCC acted quickly on the question of common carriers offering DP services, "the issue is in serious danger of being resolved by events in a manner adverse to the stated interests, both public and private, of those responding to the FCC's Inquiry."

Skeptics Deserve Factual Basis for Hardware Upgrade

By Jack Stone
Special to Computerworld

The essay in the March 7 issue of *Time* magazine titled "Science: No Longer a Sacred Cow," written by Frank Trippett, should be required reading for all persons dealing with computer center policy-making and planning functions.

The writing brilliantly characterized the new (and healthy) skepticism of American citizens toward uncontrolled scientific and technological pursuits.

In this column, the second of my new series on DP management issues, I relate this growing mood to a central problem in the computer center: the justification for new or upgraded computing equipment.

Trippett opened the essay by saying:

"America's euphoric awe of science began to ebb with the Pandoran gift to mankind of the atomic bomb.

"Yet the most extreme expression of the nation's continued reverence for science and technology — dramatized in the tendency to call products "wonders" (as in drugs) or "miracles" (as in fabrics) or "magic" (as in electronics) — awaited the moment that a human foot first touched the moon.

"That feat, the President of the U.S. assured his countrymen, was to be ranked as the greatest thing since Creation.

"After that exaltation, there was only one way, by the law of psychological gravity, for Sci-Tech's prestige to go.

"Sure enough, down it went. And in its place has risen a new public attitude that seems the antithesis of the former awe. That awe has given way to a new skepticism, the adulation to heckling."

After reading this passage, I began to wonder about the situation that prevails in DP organizations today.

Is it not so that more and more non-DP user and executive managers are becoming vociferous, if not hostile, about interminable increases in the DP budgets without commensurate improvements in DP services (at least as the critics perceive them)?

And isn't it also true that the long-used DP opiate, "Do not worry dear user, we will properly take care of your every need," frequently raises the ire instead of lowering the concerns of users?

On this point, Trippett's following comments directly apply:

"The new skepticism can be seen, as well as heard, in the emergence of a fresh willingness to challenge the custodians of arcane technical knowledge on their own ground . . .

"The public today rallies, in its untidy way, around the notion that Hans J. Morgenthau put into words in Science: Servant or Master?: *'The scientist's monopoly of the answers to the questions of the future is a myth.'*

"The fading of this mythology is the result of Americans' gradual realization that science and technology's dreamy wonders sometime turn out to be nightmarish blunders . . . (which) . . . have taught the layman a singular lesson: the promising fruits of science and technology often come with hidden worms."

One issue that is particularly troublesome to many top executives and builds mistrust in the DP center is the ofttimes slapdash and cavalier manner in which the senior DP manager justifies new or upgraded hardware.

Granting that the cost per computation is rapidly falling, the absolute dollar value of installed computing equipment continues to rise dramatically in most installations. Yet, many DP managers continue to request new expenditures for equipment with little more justification than the simple statement: "Our current configuration cannot handle current peak load conditions."

Little or no consideration is given to, first, the myriad of management actions that should be taken to ameliorate peak conditions and, second, to the proper set of utilization, performance and cost measurements which should provide the factual basis for validating the request for new hardware.

The Human Connection

Nearly all organizations have established procedures for planning, budgeting and controlling capital expenditures in areas other than computer equipment.

In part because of user outcries, many organizations are moving to bring computer equipment acquisition into the regular capital budgeting process, with proper justification for the proposed expenditures, following the lead of the larger industrial and government enterprises which have developed elaborate mechanisms for controlling computer acquisition.

To illustrate how outlandish the DP department can become in its equipment requests, I should relate the substance of a telephone call that I received from a rather frantic reader. (Curiously, the call came in shortly after I read the *Time* essay.)

The caller told me that his organization had a large-scale machine installed which had reached the saturation point at peak load time. In the past, numerous hardware upgrades were approved, essentially upon verbal request of his DP manager and based solely upon the thoughtful and erudite declaration: "The needle's banging against the pin!"

He asked if I knew of any article which could relate "CPU busy" percentages to saturation, because their CPU was "rather busy" and such an objective article would probably be all that is required to gain headquarter acceptance of the upgrade.

It seems to me that one approach for the DP center to take in rebuilding confidence and restoring credibility within the external organization involves those steps necessary to develop a factual basis for measuring computer utilization; compare actual against planned capacity; act to clean-up the work load; validate organization structure, personnel performance and training level; and construct a sensible management presentation for justifying new equipment.

This is a far better path to travel than having top management demand that such activities be done. It might even save a few DP management jobs.

Trippett summed it up nicely:

"The fact is that the new skepticism,at bottom, is not antiscience at all.

"It is only at war with the once prevalent assumption that science and technology should be allowed utter freedom, with little or no accounting to those who have to live with the bad results as well as the good.

"If the layman on the street has discovered that science is fallible, that hardly makes him its permanent enemy.

"After all, everybody has forgiven Newton for thinking that the sun was populated."

ICCP Should Reassess the Needs of DPers It Certifies

The Taylor Report
By
Alan Taylor, CDP

As expected, the Institute for Certification of Computer Professionals (ICCP) has performed the first part of its charter. ICCP widened the scope of the examinations it provides so specialists, as well as managers, can obtain recognition from the broad-based institute.

This is good; the cooperation of the various societies bodes well for the future.

However, certification — no matter how useful in its own right — is only one part of what it takes for even a specialist to have an acceptable claim to recognition.

Certification, by its nature, is a one-time operation while recognition is something that hopefully remains with us through the years of service. So far, ICCP has not recognized this fact.

This is not surprising for two reasons. One reason is historical.

The second reason is the method of updating that seems to be needed was not available for consideration by the institute until now.

There were other available candidates for update handling. However, I think they were produced and supported largely because there seemed to be no other way to handle the situation at that time, rather than for any other reason.

This no longer holds; now there is a useful way. More on that later, but let's look at the historical reason first.

Certification in the U.S. has been used in practically all the states to obtain some standard of practical proficiency in specialized areas ranging from medicine and accounting to refuse collection and hairdressing.

The method has been to provide for a board of examiners; a procedure for acceptance and testing; and then a form of continued registration and internal discipline so if you broke the rules, you could lose your license.

Until recently — about the past 10 years — the method seemed to be popular with both the state government and the public, and more and more boards were set up to handle real estate brokers, cosmetic specialists and others.

It seemed to be working well and it didn't cost the state anything. The fees for the examinations and the subsequent licenses to operate businesses generated all the necessary revenue to maintain the registers, set the exams and handle the small office staff needed for administrative purposes.

With the growth in the number of such boards and realization of the part they played in being able to exclude people, force higher prices and so on, a move against such boards was perhaps inevitable.

It came after the DP certification had been initiated in the older mode in the early '60s and effectively cut us off at the pass. We were too late to be in position with the state-recognized certification, yet too early to be able to see any new trends in which to take advantage of the new mode of certification for public and profession alike.

That was when the ICCP certification program — then with the Data Processing Management Association — came into being.

The Alternatives

The problems of the weakness of the certificate route and the understanding that more was needed from a public point of view was seen, but at first more within the profession than from outside.

Professionals understood much better than the public that the problems of computers were building up and some controls were needed. And a number of controls were suggested.

In general, these controls were based on some of the methods used by older professions, such as engineering or accounting.

Wide ranging and sometimes involving abstruse ethical or academic type codes, these solutions were really based on the idea that the answer to computer problems was to create computer "good guys" and then let them become DP dictators.

Well, that control didn't sell for two reasons. First, time was moving against any set of trusted good guys. Second, no one could agree upon just who these good guys were to be. Were they to be academic double domes or inspired researchers or systems programmers or application specialists?

Just as the ICCP itself was getting it off the ground in the early '70s, matters really came to a head. The public was getting more and more annoyed with computer abuses — as the various Senate hearings told us. (I remember one senator telling me that our profession had less ethics than refuse collectors, based upon our lack of something like an ICCP with a recognized position. I didn't like that.)

But, in the true traditions of melodrama, help was at hand from the most unexpected sources — the very abuses themselves and the growing importance of computers in all sorts of ways.

The Public Decision

In fact, the public had made the decision as to whom the good guys were to be. I think they decided better than the profession would have been able to, because the center of focus of the profession was on abstractions, while the public focused on specific cases in a case-by-case approach. They stayed within the American tradition of letting anything go on until it proved itself wrong.

Of course, this case-by-case approach is a long process. Decisions are made piecemeal — sometimes in the courts, sometimes state by state in various ways, sometimes in Washington.

But decisions are being made and the profession is expected to keep up with them. And this is where the ICCP needs to reconsider the role of certification and how it can help the profession and the people that it certifies.

The public requirement is simple. The ICCP should realize that the professionals it certifies should be aware of the decisions as they are created, whether the ICCP agrees, disagrees or can't decide whether or not it agrees with any particular decision.

There may be a role for the ICCP as an advocate, but there certainly is a role for it as a reporter. And advocacy could very well taint that reporter role.

Little Privacy News

Take the recent news, for instance; we have had very little, if any, on the privacy front. But that does not mean that the landmark decisions regarding the affirmative duty of maintaining personal privacy in certain areas has been forgotten.

What might be of permanent importance in this area is the recent report on the cost of maintaining privacy issued by the General Accounting Office (GAO). The ICCP might well consider that the GAO report is something that certificate holders should know about.

We have had action on two major fronts: the tangibility of software and the contractual rights under contracts where performance is not guaranteed. We also have information about the ability of internal auditors to finger computer abuses, in the form of a research report.

As I see it, the court decisions are clearly items the profession should know about — and in a little more permanent form than the headlines of *Computerworld*. The others are matters where there reasonably can be a difference of opinion as to whether they are important, so I leave that question open.

For everybody's sake, the ICCP should consider the needs of the people it certifies after the certificate is issued and of the profession in general.

I see it taking a stand on what makes its certificates constantly valuable, and not just one-time achievements that go out of date; but doing so through reporting — not advocacy or dictatorship.

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A DBMS Alternative—Part 1

Back-End DBMS Provides Relief for Overloaded CPUs

By James Goodrich
Special to Computerworld

Today's data base management systems (DBMS) operate with application programs and DBMS software resident in a single CPU. In most instances, this arrangement is efficient. Several applications share a single copy of the DBMS to reduce main storage requirements and control concurrent access of the data base resource.

However, as an organization integrates more and more of its data into an independent, corporatewide data base, the DBMS must be resident in the CPU most of the day. At this point, DBMS overhead, real and virtual main memory requirements, CPU time, I/O time and channel contention must be considered as a single cost.

Organizations experiencing heavy data base activity are beginning to examine alternative methods of data base processing that relieve the mainframe of the DBMS function. One such alternative is the implementation of a back-end DBMS.

The back-end DBMS concept involves off-loading the data base management function from the host CPU to a dedicated minicomputer, or "back-end" processor. In this arrangement, the minicomputer performs only DBMS functions, while the host CPU is relieved of this activity to service concurrent, nondata base applications.

The dedicated "back-end" processor is limited to servicing data base requests from host-resident data base application programs. All I/O interfacing with the user's data base is performed by the back end, including mapping between CPU-resident data base descriptions and the actual secondary storage devices that contain the data base.

Adopting the host/back-end approach, data base software is divided between the two processors. The user's application program resides in the host CPU, along with an interface routine that intercepts data base requests from the application and a message system that channels those requests to the back-end machine.

The DBMS, on the other hand, resides in the back-end processor, interpreting data base requests and initiating access to the user's data base. The back-end machine also has a message system that returns data to the host CPU or an error condition upon unsuccessful access to the data base.

The back-end concept lends itself to a wide range of configurations including:

- A single dedicated back-end arrangement in which a dedicated mini services all DBMS requests for a single host CPU.
- Multiple dedicated back-end configurations in which several minicomputers service a single host, but each back-end processor has exclusive access to a particular data base.
- Distributed back-end system in which all data bases may be accessed through any back-end machine. For distributed configurations, a microprocessor selector is required to control record lockouts; the selector requires no software.
- Multiple host configuration in which several hosts have access to a centrally located data base via a single back-end processor.
- Dedicated and distributed networks involving several host and several back-end machines.

Reader Commentary

This discussion, however, will concentrate on the single dedicated back-end configuration.

The advantages of the back-end approach may be broken down into the following categories: performance, host main memory, cost, data base recovery, data base security and data sharing.

Two important CPU performance considerations are, of course, turnaround time and throughput. Both areas may be improved with the host/back-end arrangement.

Turnaround time in this context refers to the time it takes for the back-end processor to respond to DBMS requests from the host. Since data base requests may result in several I/O accesses to the user's data base and since I/O devices are much slower than the CPU, the total number of back-end I/O operations becomes the dominant factor in a performance analysis.

By transferring DBMS requests to the back end, data base I/O is separated from and may overlap all other I/O activities. This reduces I/O channel contention and lessens turnaround time.

The back-end configuration can increase throughput by increasing the multiprogramming of the host CPU. By freeing up host main memory and CPU cycles, the host/back-end configuration maximizes the CPU overlap between the two processors.

Reduces Memory Needs

The back-end approach can reduce host main memory requirements in two ways. First, by off-loading the DBMS to the back end, host main storage and processing cycles may be reduced considerably.

Secondly, the back-end processor may assume control of various secondary device-handling tasks, relieving the host main memory of those I/O drivers and buffers normally allocated to data base activity. The cost/performance ratio is thus improved because of the cheaper costs of minicomputer memories and their comparable speed.

Improved host throughput accounts for the major cost advantage of back-end DBMS. Since data base processing has been delegated to the minicomputer, host machine resources such as CPU cycles and primary memory are freed up to process more programs.

In addition, since minis are currently priced nearly an order of magnitude less than large-scale processors; the cost per instruction executed is noticeably reduced.

Also, the inherent modularity of the back-end system simplifies system upgrades. As data base activity increases, the back-end processor may be replaced with a more powerful minicomputer or complemented with an additional mini operating in parallel. In either case, the cost of the new CPU is far less than the cost of a large mainframe upgrade.

Besides the lower purchase price of minicomputers, less costly maintenance agreements and the possibility of in-house maintenance are attractive.

Data Base Recovery

Backup and recovery of the data base is simplified by the back-end approach. Continuous, concurrent transaction logging is performed by both the host and back-end CPUs. Input transactions may be logged (e.g., written to tape) by the host while data base updates are logged by the back end.

Consequently, if the host system "goes between" the back-end system can immediately "roll back" any active transactions by applying "before images" to the affected data base areas and writing a checkpoint to the journal tape for subsequent restart.

If the back end were serving a single host, it could halt processing at the point of failure. If it were operating with several hosts, it would continue servicing the other CPUs as normal.

On the other hand, if the back-end system were to fail, the host could stop all DBMS service requests, but continue all nondata base processing as usual.

If data base integrity were affected by the failure, two steps could be taken for recovery: utilities could be used to return the data base to its condition at a specified previous time; then, upon data base recovery, the host could reprocess all transactions from the time of the failure, using the contents of its journal tape.

Thus, two or more machines would be less disrupted by one system's failure and, upon failure, the recovery would be more orderly.

Goodrich is a technical writer at Cullinane Corp. in Wellesley, Mass. Next week he will discuss the security and data sharing advantages of a back-end DBMS system, detail the major disadvantages of the back-end approach and describe Cullinane's development of a prototype system.

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Current Efforts Confuse Scene

New Ideas Sought to Bring Order to Package Surveys

By Don Leavitt
Of the CW Staff

Here I sit, scratching my head and wondering what it all means. Comments and suggestions from readers would be welcome.

My predicament? There are numerous software packages now on the market, and many of them are well-received. Unfortunately, there is still no substantial system of accumulating evaluations so prospective users can gain objective information about how the packages perform across a spectrum of sites.

Too often, they can only talk to a sampling of users, the names of whom generally come from vendors.

Not long ago, we saw the report of user ratings of packages and the selection of the 1976 Software Honor Roll by Datapro Research Corp. [CW, Jan. 17]. More recently, packages with high sales volumes — and high numbers of installations — were saluted at the Million Dollar Award Ceremony hosted by International Computer Programs, Inc. (ICP) [CW, March 28].

These two events are probably the best indicators we have of how well the packages are serving their users and how well the vendors are supporting their clients.

But the numbers of users responding to the Datapro survey were very small compared to the numbers of installations reported at the ICP dinner for the same packages. It's possible the small sample is statistically valid, but I'm not the only person who has questioned the practice of building the Honor Roll on as few as six responses.

That sounds like a harsh criticism of the Datapro effort, and that's exactly what it is — but only with respect to the naming of the Honor Roll itself. The basic idea behind Datapro's survey is valid and commendable, and certainly many of the Honor Roll packages were rated by more than the minimum six users.

The other side of the coin is that the ICP installation counts may be questionable since they were supplied by the vendors and ICP has few means of checking their accuracy, according to an ICP spokesman.

Sometimes figures on installations were not supplied even though sales volumes were. In its report to ICP on Scert, for example, Comten, Inc. cited that package's $20 million sales and said nothing about how many sites are using it — although it added, irrelevantly, that its Alert package has 95 users.

The top award at the ICP dinner went to Cincom Systems, Inc.'s Total, which reached the $50 million level and is installed at 1,500 sites. As with many of the ICP "winners," Total was on Datapro's Honor Roll, with ratings by 113 users.

Analysis

At the $30 million level was Mark IV from Informatics. That has 1,103 installations, according to ICP, and though it missed the Datapro Honor Roll this year, 57 users reported their ratings to the researchers.

Comten's Scert, a simulation system, reached the $20 million plateau, but — as noted above — the vendor gave ICP no count of installations. Datapro apparently received ratings from one or two users at best in its write-up on the product, but said "the vendor can claim that over 400 users have run Scert at one time or another."

The Human Resource System from Information Science, Inc. was another $20 million package, with 280 installations, according to ICP. It did not appear on Datapro's survey results.

The third $20 million package was Talk from Systems Architects, but here again ICP had no data on the number of installations and was somewhat disconcerted when no representative of the firm was present to accept the award at the recent dinner.

Fourteen packages have accumulated $10 million sales, ICP said. Among these are Honor Roll entries The Librarian from Applied Data Research, Inc. (ADR), Panvalet from Pansophic Systems, Inc. and Grasp from Software Design, Inc. (SDI).

The Librarian was at the top of ICP's count list with 3,300 installations; Panvalet was in second place with 3,000. The ADR product was represented by 119 users on the Datapro survey, while Panvalet had 172 entries.

ICP had no count for the number of installations of Grasp (or any of the SDI products), but Datapro got ratings from 81 users. In another report, Datapro indicated it is against SDI policy to disclose the actual number of installations.

From another perspective, I'm puzzled by packages — especially ones for applications — that have a large number of installations but were not heavily represented on the Datapro survey. Johnson Systems' Job Accounting/Reporting Systems, for example, have 1,050 users, but only 29 provided information to Datapro.

Datapro said it mailed out 30,000 questionnaires and encouraged respondents to duplicate the form if they wished to rate more than one product. The researchers received only 3,659 ratings, so they are also concerned with finding a way to collect more information and making their results less subject to criticism.

Any ideas?

'TCS' Manages DOS/VS Tape Libraries

LOS ANGELES — TCS was described by its vendor, Viking Data Systems, Inc., as a real-time tape library management or control system for the IBM DOS or DOS/VS user.

The package "addresses itself to the market served by Epat [from Software Design, Inc.] and Tfast [from Oxford Software Corp.] and gives users a viable third choice," a Viking spokesman stated.

TCS protects the user at both ends of the processing cycle. Checking of input tapes extends beyond label checking to include confirmation that the correct version of a data file is being used; it also checks tapes mounted to receive output to ensure active files are not accidentally destroyed.

The Viking package supports both Automatic Volume Recognition (AVR) and Early Device Release, he emphasized. AVR enables the system to seek the tape it wants on any tape drive; since drives are not tied to specific partitions, they can be used more efficiently, he said.

If the required tape is not found by TCS, the system will generate a console message asking that the file be mounted on any available drive, the vendor added.

TCS releases the drive assignment when a tape file is closed without waiting for any rewinding or unloading to be completed. This makes the drive available to any job, job step or partition sooner than previously possible, the spokesman noted.

The package generates a series of standard reports of all tape activity, but also provides a "comprehensive report customizer" allowing the user to create and receive any report that may be unique to the installation.

TCS can be rented for $200/mo or leased on a two-year contract for $175/mo, the vendor said from 1611 S. Hope St., Los Angeles, Calif. 90015.

SDC Search Service Reports Grants Data

SANTA MONICA, Calif. — Detailed information on more than 1,500 grant programs offered by federal, state and local governments, commercial organizations and private foundations is now available at user terminals through the Search Service of System Development Corp. (SDC).

The grants data base provides information for 88 different disciplines and is updated monthly so all entries are current. Requests for information can be by foundation or other granting organization, but more typically are by subject area, an SDC source indicated.

Searches can be conducted on-line, but users often request that detailed information about particular grants be printed off-line overnight and mailed to them.

SDC is at 2500 Colorado Ave., Santa Monica, Calif. 90406.

North East CMG Opens Doors

NEWTON, Mass. — A combination organizational and working meeting of the North East Computer Measurement Group (CMG), to be an affiliate of the national Computer Measurement Group, has been scheduled for April 15 at the Marriott Hotel here.

Questionnaires have been sent out to all members of the national group who work in this area, but organizer Jeff Buzen of BGS Systems stressed the meeting is open to anyone.

The regional group is expected to meet quarterly and to publish its own newsletter as well as contribute to the work and publications of the national group.

To help him in planning for the first meeting, Buzen has asked interested people to contact him at BGS Systems, P.O. Box 128, Lincoln, Mass. 01773.

25,000 Abstracts Listed by NCPAS

WASHINGTON, D.C. — Abstracts outlining some 25,000 software programs are now in the data base of the National Computer Program Abstract Service (NCPAS). They cover "all fields of knowledge from business, government, industry, military and universities," a spokesman claimed.

The program information is disseminated in a quarterly index and newsletter, which shows the number of abstracts available on each subject, and in special abstract reports which list all the abstracts on any specified subject, he explained.

The index/newsletter is available for an annual subscription of $10 while the subject-oriented abstract reports cost $19 for the first 200 abstracts and $6 for each additional 200. A free index to all the abstracts can be requested from NCPAS, P.O. Box 3783, Washington, D.C. 20007.

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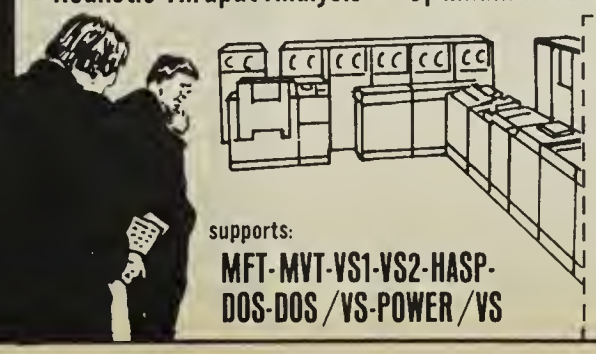

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Inforex Software Enhanced, Storage Doubled

BURLINGTON, Mass. — The disk capacity of System 3300, the data entry and editing system from Inforex, Inc., has been more than doubled under a control software release which also increases the size of the system libraries and enables the 3300 to support index sequential tables.

Under Release 401B, available now, the disk storage capacity has been raised from 10M- to 24M bytes. The expansion of the system libraries allows record data to be retained longer while the index sequential support increases the system's speed and improves operator efficiency, Inforex claimed.

The editing capabilities of the 3300 "sharply lower" the time a user's CPU must spend editing data and this, in turn, reduces or eliminates repetitive keying from data entry devices, according to a spokesman.

The index sequential support allows both table validation and table insertion capabilities to be used more efficiently, he said.

By allowing users to index the stored tables, Release 401B permits faster access to data — the system can respond to inquiries of tables as large as 2M char. in less than a second, he said.

Table insertion operations — the ability to pick up stored data based on user-defined codes carried in the input record — are also executed more quickly with indexing than they were previously, he added.

This facility reduces the number of characters that have to be keyed into each record, simplifying the data entry procedure, he noted.

The file library on which the 3300 records production statistics about each batch of records brought into the system has been enhanced.

Previously, only 300 batches could be managed at one time. Now, 750 batches can be posted to a 10M-byte disk and 1,500 can be put out on the 24M-byte disk.

The updated control software also enhances the foreground editing capabilities of System 3300 with respect to communications. The system can now perform calculations across record boundaries during data entry, the spokesman explained.

The software release is available free to current and new Inforex System 3300 users, Inforex added from 21 North Ave., Burlington, Mass. 01803.

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Washington	April 11-15
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This course, based on the report "EDP Job Costs and Charges", by K.W. Kolence and R.A. James, is intended for individuals involved in chargeback systems and EDP cost accounting and budgeting. The course describes how to establish an effective EDP cost control system integrated with all capacity management information.

Course registration fees: $350 members, $600 non-members
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To register for these courses, or for further information on reports, courses, workshops, conferences, and Institute Membership, contact
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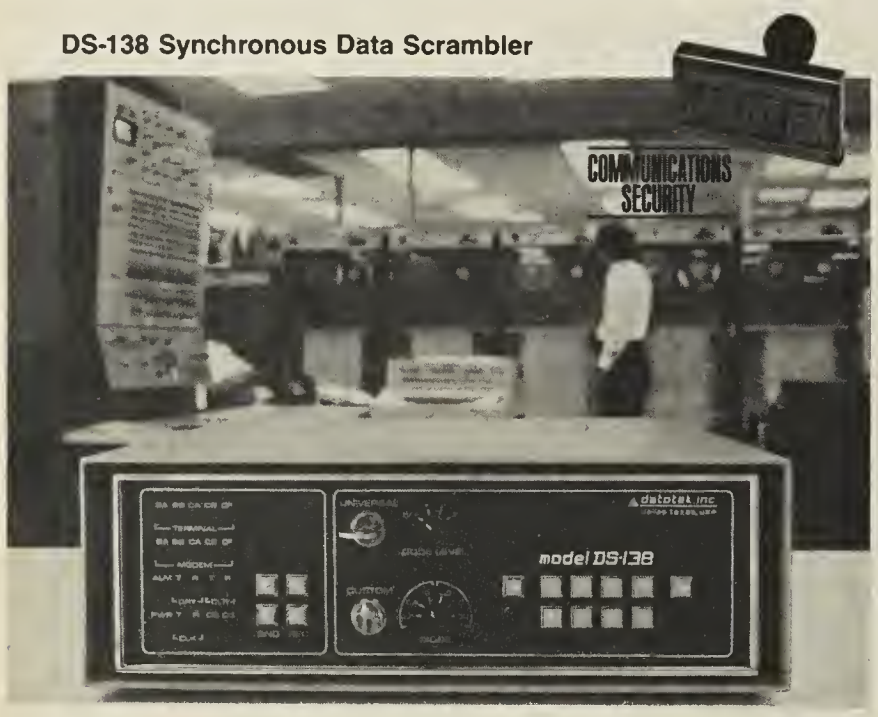

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Data security problems have existed ever since the advent of major computer centers accessed remotely via dial-up or dedicated lines. They're even more critical now with Electronic Funds Transfer becoming a reality with millions of dollars on the line.

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Codasyl Adds Journal On DML for Fortran

OTTAWA, Ont. — The *Codasyl Fortran Data Manipulation Language (DML) Journal of Development* is now available through the Department of Supply and Services of the Canadian government.

Documenting the work completed thus far by the Fortran DML Committee of the Conference on Data Systems Languages (Codasyl), the journal is printed in loose-leaf form so it can be updated easily when and if the committee sees a need to change its text, a department spokesman noted.

In the loose-leaf format, the journal also becomes a companion volume to the *Cobol Journal of Development 1976,* published and maintained — through regular releases of page changes — by the same Canadian government unit.

The cost of the initial *Fortran DML Journal of Development* is $4/copy, the spokesman stated, adding that the Cobol journal costs $7.50/copy.

No price was quoted for a subscription service to keep the Fortran DML publication up to date.

Since the publications have been funded, in part, by the Canadian government, appropriate payments — must accompany any orders for the journals or, in the case of the Cobol journal, the page changes.

Questions about the journals or orders for them should be sent to the Material Data Management Branch, Dept. of Supply and Services, Metcalfe Building (5th Floor), Ottawa, Ont., Canada, K1A OS5.

CPEUG Seeks Papers

WASHINGTON, D.C. — A call for papers has been issued for the 13th Meeting of the Computer Performance Evaluation Users Group (CPEUG).

The meeting is scheduled for October and papers are due by June 1, according to Program Chairman Dennis Conti of the National Bureau of Standards (NBS).

CPEUG is sponsored by NBS and provides an information exchange for federal managers and technicians, as well as interested people from the private sector, in the areas of procurement and planning in addition to performance evaluation, Conti said.

This year's meeting — focusing on the DP life cycle — will be held Oct. 11-14 in New Orleans, with the U.S. Department of Agriculture acting as host.

The conference will include technical sessions, workshops, tutorials and vendor presentations.

The technical sessions will cover such areas as work-load definition, selection of DP systems and services, prediction methods, performance measurement and management reporting.

Papers are sought in all these areas and those accepted after refereeing will appear in the conference proceedings to be published by NBS, Conti noted.

Completed papers (in triplicate) and workshop proposals are due by June 1, he reiterated, and notification of acceptance July 1.

Abstracts, papers and proposals should be mailed to Conti at A265/ Technology Building, NBS, Washington, D.C. 20234.

Users Set Sequence Rules With 'Fordoc' Enhancement

LOS ANGELES — The Fordoc Fortran documentation software from J. Toellner & Associates has been enhanced, according to the vendor.

The system continues to resequence statement labels, indent statements within DO loops, cluster FORMAT statements and cross-reference both statement labels and variable names.

Now, however, it will also allow the user to declare the sequence gaps between statement labels, the starting card sequence number and the sequence gap in the source decks, a spokesman noted.

Written in Fortran, Fordoc is available as a package for use on IBM 360/40s and larger CPUs. It costs $3,000.

The facilities of the package are also available on the remote-computing network of National CSS, Toellner said from 4311 Wilshire Blvd., Los Angeles, Calif. 90010.

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Multiple Accesses Controlled Under Update of Image/1000

PALO ALTO, Calif. — Image/1000, the information management software from Hewlett-Packard Co., has been enhanced in three significant ways, according to the company.

Contentions among multiple terminals concurrently seeking to update information on the same data base are now resolved by the system, a spokesman noted. Beyond that, Basic has been added to the languages to which the system responds.

Another modification gives on-line access to dynamically changing information received from instrument arrays that are operating under an HP 1000 system's control, he said.

To resolve contentions, contenders are queued as they enter the system and given access to the system in turn.

Query, the English-like interactive language included in Image/1000, has been similarly enhanced, he said.

The second change in Image/1000 — adding Basic — will appeal especially to scientists and engineers, he indicated, adding that Basic is now widely accepted as a language with which to program system-controlling computers.

The ability to have data delivered from instrument arrays functioning under an HP 1000 gives users an opportunity to look at the information on-line, while an experiment or process is under way, the spokesman continued.

The enhancements will be included in all new orders for HP 1000 systems with Image/1000; users with software subscriptions for Image and for Basic are receiving the changes free.

Nonsubscribers can get the revisions for Image and for Basic — both are needed if the system is to work to its full capability — in upgrade kits for $150 each, the spokesman noted from 1501 Page Mill Road, Palo Alto, Calif. 94304.

'Efire' Eases Work Of DOS/VS Operator

GREEN BAY, Wis. — Dynamic Products has introduced a program that simplifies the operator's work in an IBM DOS/VS environment, but a spokesman admitted there is a calculated risk in using the package.

The Equal File ID Response Eliminator (Efire) program negates the need to respond to the EQUAL FILE ID IN VTOC message. Effectively, this turns the message into an informational log entry.

The risk cited by the spokesman lies in the possibility that the situation may require more than a carriage return.

If the percentage of time the operators should respond with "CANCEL" is very small, "you can probably afford the risk," the spokesman commented.

Efire is added to the DOS/VS system, but does not modify any of the code supplied by IBM. The program, after being cataloged, replaces an IBM component via a maintenance rename procedure, he said.

The only message affected is the EQUAL FILE ID IN VTOC one; all others function exactly as they would prior to implementing Efire, the spokesman claimed.

Efire is an Assembler program that has been tested on all DOS/VS releases from 29 through 33, he said. It is available in either relocatable form for $450 or in source code form for $750.

Dynamic Products can be reached through P.O. Box 3445, Green Bay, Wis. 54304.

Macros for Series/1 Aid Programmers

BIRMINGHAM, Ala. — Graham Computer Enterprises, Inc. (GCE) has announced a set of structured programming macro instructions designed to give high-level langauge control structures to the Assembler programmer working with IBM's Series/1 minicomputer.

According to GCE, the macros provide the following control structures: IF-THEN-ELSE, REPEAT-UNTIL, WHILE, FOR, SEARCH, as well as the case situation.

In this implementation, the structures are designed to be like those of Pascal, to ease conversion to that language from the Assembler which IBM provides.

GCE is planning to implement a Pascal compiler for the Series/1 "in the near future," a company spokesman said.

Cost of the structured programming macros is $75 per machine, GCE said from 3 Office Park Circle, Suite 106, Birmingham, Ala. 35223.

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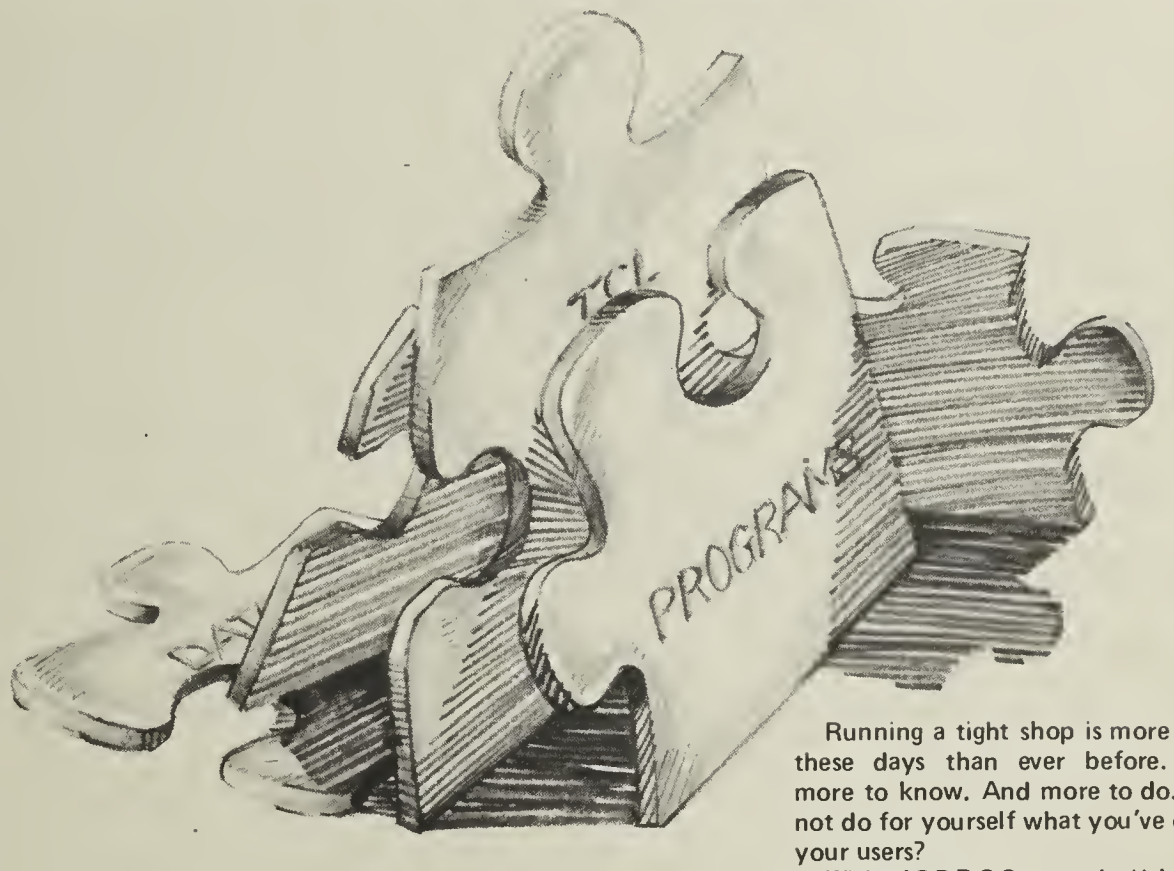

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Siemens Aids Librarians

ERLANGEN, W. Germany — The Bikas2 package provides Siemens System 7 or System 4004 users with a facility to compile a wide variety of catalogs and registers complying with various accepted standards, a spokesman for Siemens reported.

The edited data complies with the German Rules for Alphabetic Cataloging and the International Standard Bibliographic Description, he said, noting the data can be output on microfiche, on one- or two-column page formats or as international library slips.

No special devices or media are required to enter data into the system. The package can supply primary and secondary entries and references in alphabetic, systematic and subject catalogs.

In addition to support for extensive but conventional updating of an established data base, Bikas2 enables users to add single- or multivolume titles to existing publication series, perform catalog sorts according to established rules and process upper/lower case letters, special characters and diacritical marks, Siemens said.

The package was built on a so-called analytical data entry scheme that enables a book title to be broken into its bibliographic elements.

The system requires a 128K-byte CPU. Other information is available from Siemens AG, Office of Information, Postfach 3240, D-8520 Erlangen 2, Federal Republic of Germany.

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Package Eyes Data Entry Clerks' Work

MAPLE GLEN, Pa. — The Accountability in Data Entry (Aide) package from Standards, Inc. (SI) reportedly provides an IBM 360/370 or Univac Series 70 installation with the means to set work standards for data entry operators and to determine how well they are meeting those standards.

The package was designed as two systems that can be acquired and used separately. The Rateaide module analyzes a sample of production input and computes hourly rates; the Analaide module applies the rates to actual work and reports how well each operator performed.

Rateaide is controlled by a deck of parameter cards describing the fields to be analyzed. The cards show the position and length of each field as well as the data type (alpha or numeric) and if the field is to be verified.

Other parameter entries show when skipping, zero filling, automatic duping and other machine-dependent facilities can be used. Applying all this data to a Measurement of Time and Motion (MTM) elemental table, Rateaide creates a job rate expressed in either record/hour or keystroke/hour as the user chooses, SI said.

Rateaide produces accurate rates, a spokesman claimed, because all allowances are earned on an occurrence basis and are not estimated. Aide actually creates an operations research module of the operator and redoes his job, but allows 20% for personal fatigue before coming up with the final rate, he explained.

Once the installation's rates are established, Analaide can be used to produce four reports showing operator performance on a daily, weekly and monthly basis and summarizing jobs by the week.

Written in Cobol, the Rateaide module costs $8,900 while Analaide costs $3,000, SI noted from 874 Welsh Road, Maple Glen, Pa. 19002.

'TSX' Shares Background Among Many RT-11 Users

NASHVILLE, Tenn. — Up to 10 users can share the background facilities of Digital Equipment Corp.'s RT-11 operating system for PDP-11s with the Time-Sharing Extension (TSX) package from S&H Computer Leasing Co., a spokesman claimed.

Programs supported by TSX include those written in Fortran, Macro Assembler, Dibol and Basic as well as those using the facilities of DEC's EDIT, LINK and PIP functions.

A real-time task can run in the foreground partition while TSX time-shares the background.

Features provided by TSX are said to include fully automatic spooling to multiple line printers and a record-locking facility to provide controlled access to a common file being concurrently updated by several users.

TSX runs on any PDP-11 that has 20K words of memory, an RK05 or other fast disk suitable for program swapping and a line frequency clock.

TSX costs $995 and can be ordered from S&H at 3709 Trimble Road, Nashville, Tenn. 37215.

Errors in Vsam Shown by 'SIS'

SACRAMENTO, Calif. — The System Interrupt Supervisor (SIS) dump reformatter program from Software Module Marketing (SMM) has been extended to provide Vsam diagnostic information as well as data useful in debugging IBM OS, OS/VS and IMS operations, the vendor said.

Based on parameters passed to it through JCL entries, SIS gains control at Abend time and selectively lists various user fields, control blocks and other pertinent information in a readable format, SMM said.

SIS for OS is available for $2,500 while the IMS-DL/1 version costs $5,000, SMM added from the Crocker Bank Building Penthouse, 1007 Seventh St., Sacramento, Calif. 95814.

Varian Adds Software For Off-Line Plots

PALO ALTO, Calif. — The JPR software package now available from Varian's Graphics Division allows users to create off-line plotting tapes on full-scale CPUs for later playback on a Varian Statos printer/plotter.

JPR is a Fortran-callable routine that interprets user calls and generates the raster format required by the electrostatic process used by the Statos equipment, Varian said.

The software runs on IBM 360/370s under OS and costs $1,000 for object code or $2,000 for source statements. Options supporting special capabilities are separately priced, the company added from 611 Hansen Way, Palo Alto, Calif. 94303.

ACM Plans Meet on DBMS

NEW YORK — "Data Base: The Practical Issues" will be the theme of the Association for Computing Machinery (ACM) Greater New York Regional Conference here May 23-24.

Privacy and security issues will be a major concern of the conference. The keynote speaker will be U.S. Rep. Edward I. Koch (D-N.Y.), who coauthored the Privacy Act.

There will also be a technical session on the subject, the association said.

Other sessions will consider such topics as implementation of data base management systems (DBMS) and their impact on the user organization and, at the other end of the spectrum, on DP operations.

Problems of data base design, administration and the use of data dictionaries and directories will also be covered, ACM noted.

Technical discussions on evaluating, selecting and acquiring data base systems will be supplemented by a commercial program of presentations by vendors of the systems now on the market.

The conference will be at the Biltmore Hotel in mid-town Manhattan. More information is available from conference chairman James M. Adams at ACM headquarters, 1133 Ave. of the Americas, New York, N.Y. 10036.

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CW-477

UK Study—Part 2

Trial DBMS Use Seen Best Way to Recognize Problems

By Frank E. Taylor
Special to Computerworld

Distributed data base management systems (DBMS) are likely to be implemented initially as a consequence of practical considerations. For example, two companies previously using independent data bases may combine and then wish to merge them into one DBMS while other organizations may wish to rationalize large files replicated several times within a distributed system.

Bill Olle, an authority on data base systems, has said he doubts if any user can go directly from a conventional file-handling system to a distributed DBMS since the activities within and between processing entities of the same system can often only be determined in a live environment. A careful analysis of the live environment is clearly a minimal need.

In large systems with limited interprocess and intersubsystem interaction, analysis followed by a centralized pilot implementation or simulation may suffice; in many cases involving random and specified interaction between processes and files, however, a limited life centralized implementation may be the only way of implementing an effective and efficient distributed DBMS capable of coping with undefined complex interactions.

The second alternative — that of simulation — is currently being used by a leading UK insurance company using third-generation equipment and a proprietary centralized data base package. It has provided an on-line system to two of its branch offices, which simulate the facilities which would be provided by local in-house DBMS.

This system is giving valuable design data for a number of random inquiries, and the frequency of inquiries from branches (presently input to the system manually) will enable local file structures to be designed to maximize performance, in terms of minimizing access times for the various types of inquiry.

This is the second of two articles on distributed DBMS. In the first [CW, March 28], Taylor outlined the circumstances leading to the development of such systems.

Later, this company plans to implement a distributed system with distributed processing and storage within each of its branch offices.

The insurance field is, in fact, a natural area for the application of distributed technology, since the activities within any branch office relate to its local business catchment area and data transfer to and from other offices is the exception rather than the rule.

Distributed DBMS are therefore emerging slowly. Within any company where standards and procedures are uniformly applied, the transfer of files to a distributed DBMS based on today's implementation should be a simple generation of appropriate structures and the appointment of a single data base administrator.

However, as indicated last week, such a step should not be taken until a clear need is established. Within the UK, no clear need for distributed DBMS has been encountered to date.

Heterogeneous Implementations

When heterogeneous implementations are proposed — e.g., the merger of two differing previously independent data-handling systems — then a vast number of other problems enter.

For example, compatible standards must be provided for data description before data can be interchanged; some means must be provided for interchanging structure information, which must again be standardized; and the communications protocols used for interconnection and intercommunication must be compatible.

Indeed, the interconnection of the subsections of a distributed DBMS includes most of the standardization problems presently encountered within DP equipment.

Paradoxically, the case for distributed DBMS use in the future depends very much on communications tariffs. If these tariffs continue to rise, it may become more economical to distribute elements within a DBMS and handle many interactions locally, thus reducing the use of communications links. Then distributed DBMS may well take off.

If, on the other hand, improvements in communications technology lead to lower tariffs, it may well be more economical when DBMS are required to transfer all data and related actions to and from a centralized system.

Finally, another major factor presently emerging — highlighted at the Eurocomp conference in London in September — might just swing the balance in favor of distributed DBMS. This is the fact that complex software systems appear to have a critical size beyond which growth is virtually impossible because the cost of increasing the size exceeds the benefits which would result.

This factor, highlighted by Prof. M. Lehmann of Imperial College London, might well force the users of the largest systems to distribute their DBMS in order to remain below the critical threshold size above which growth and maintenance both become very major problems.

Taylor is on the staff of the UK's National Computing Centre and coauthored, with P.J. Down, the center's recent report titled Why Distributed Systems.

Service Backs Analysts

WALTHAM, Mass. — The Business Analysis service now on the First Data Corp. remote-computing network includes the Analysis of Quantitative Data component, a collection of cross-sectional statistic programs.

The Sibyl/Runner component handles business forecasting and time-series analysis; the Statistical Evaluation of Econometric Relationships subsystem completes the service.

The service is for the analyst with "moderate knowledge" of statistical methods and "little or no computer background," the vendor said from 40 Second Ave., Waltham, Mass. 02154.

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Operators Don't Bother With Errors

Intelligent Preprocessing Hastens Insurer's Data Entry

By John P. Hebert
Of the CW Staff

BOSTON — With intelligent preprocessing, a large insurance company headquartered here has pushed data checking back to the data entry level to reduce time-consuming clerical housekeeping chores.

In addition to the smaller home-office computer entry of actuarial and underwriting claims, Liberty Mutual Insurance Co. maintains two major input centers for its nationwide policyholder and information network.

The two centers, located in New Castle, Pa., and Lewiston, Maine, are considered remote extensions of the Boston home office because they handle field transactions of financial and statistical data.

Statistical, premium, claims loss information and policyholder reports originate from the company's field organizations, according to Jim Callanan, manager of input systems.

The information is coded at Liberty Mutual's divisional offices and reaches the input centers as batches of data to be keyed. An average of 800,000 verified records are transmitted each month from Mohawk Data Sciences Corp. (MDS) 2400 preprocessing key-to-disk systems at the two input centers to Liberty's two IBM 370/165 CPUs here.

Eight Preprocessors

A total of eight MDS 2400 systems support about 114 key-to-disk stations at the three locations, Callanan said. Half of the 2400 preprocessors and a majority of the intelligent CRT stations are located in the Pennsylvania center to process premium information, he said.

Another 40 key-to-disk stations tied to three MDS 2400s handle financial loss information and the policyholder reports at the Maine input center.

The terminal systems transmit the information after it has been corrected for accuracy to the home-office CPUs over dedicated voice-grade lines at 2,400 bit/sec through Bell modems and MDS 2405 and 2409 controllers.

These remote controllers are used for applications processing, while an MDS 2405 at the CPU site here is used as a data receptacle for transmissions coming from the input centers.

At the central site, tapes containing the preprocessed information are manually taken off the 2405 and mounted on the CPU's tape drives for number crunching and data base updates.

Input center terminal operators aim for speed in keying, Callanan said. Accuracy is enforced later during editing procedures on the 2400 preprocessors.

Because of this, one bad record doesn't delay processing 99 good ones. The work keeps moving and key operators are not burdened with detecting errors they have no way of correcting, he added.

Liberty Mutual has found it more economical to push checking back to the data entry level and correct errors close to the source. Expensive reruns of error batches can be avoided because of this approach.

Before utilizing the preprocessing approach, the central computer decided what the input should be. This sometimes locked keyboard operators into rigid, awkward and unnatural keying patterns, Callanan said.

By lacing the input cycle with system intelligence, Liberty Mutual achieves more flexibility for its operators, he indicated. Their time is spent on productive keying with little or no concern for formatting or error-correcting decisions, most of which are handled by the system.

Liberty has similar preprocessing systems using Digital Equipment Corp. PDP-11/70s at nine divisional work centers in the U.S. and Canada to maintain regional master files on worker's compensation insurance, of which Liberty writes more of than any other insurer, Callanan said.

Staff-Written Programs

The managerial and coding staff of Liberty Mutual's two input centers have written many programs for the preprocessing applications. The MDS 2400s are programmed in Mohawk Data Language

(Continued on Page 30)

Batch Unit Works for CDC, IBM Users

MINNEAPOLIS — Control Data Corp. has introduced a computer-based remote communications terminal for users of CDC or IBM mainframes or CDC's Cybernet remote computing network.

The Cyber 18-5 remote batch terminal (RBT) expands remote data-handling applications for the Cyber 18 family of stand-alone minicomputers, CDC said.

The basic terminal includes one of three controlware programs that enables it to emulate a CDC 200 terminal or IBM 2780 or 3780 devices, a spokesman added.

The basic Cyber 18-5 includes a microprogrammed processor with 16K bytes of 750 nsec core memory, a CRT and operator console with keyboard, the terminal emulation program, communications control capabilities, a peripheral controller, a card reader and a line printer.

The basic memory can be expanded to 65K bytes, CDC noted.

An optional magnetic tape unit can be added to the basic configuration. This can lower total charges for communications line use and connect time, according to the spokesman.

Concurrent Functions

On-line batch and local utility functions can be performed concurrently, including communications between the Cyber 18-5's CRT, card, printer or tape units, while data is being transferred between the terminal and host CPU, he said.

Switch-selectable transmissions of 1,200- to 9,600 bit/sec are conducted in half-duplex synchronous mode, he added. Standard interface compatibility is provided for RS-232C and CCITT V.24 protocols.

One of a series of three controlware programs also is included with the basic terminal. These programs enable the terminal to emulate operations of a CDC 200 terminal where the host computer is a CDC 3000, 6000, Cyber 70 or 170 system or an IBM 2780 or 3780 RBT, CDC said.

The Cyber 18-5 also includes controller and interface logic for the operation of card readers and line printers.

Peripherals Options

Up to three CDC Model 1860 magnetic tape transports can be added to an 18-5 terminal to support higher speed batch entry applications, the spokesman said.

Tape drives operate at 25 in./sec, record data at 800 bit/in. and are available in 7- and 9-track models.

CDC Model 1829 card readers are available in 300- and 600 card/min versions and each is housed in a desk-top unit, the company said.

Optional line printers provide 300- and 600 line/min output, it added.

Software available with the RBT other than the terminal emulation controlware programs is CDC's Cyber 18 Real-Time Operating System (RTOS). A compatible subset of the company's Mass Storage Operating System (MSOS) used with other systems in the Cyber 18 family, RTOS requires no mass storage disk devices, CDC said. It occupies a minimum of 3K bytes of main memory in a Cyber 18-5 subsystem.

Purchase prices for the Cyber 18-5 range from $28,345 for the basic control unit with 300 card/min reader and 300 line/min printer to $59,915 for a terminal configuration that includes two tape transports plus a 600 card/min reader and a 600 line/min printer.

Leases are available on a one-year contract, including maintenance, for $1,084/mo and $2,482/mo respectively.

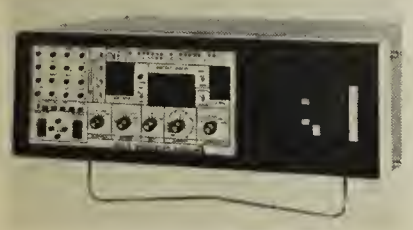
CDC can be reached at Box O, Minneapolis, Minn. 55440.

Cyber 18-5

Datascope Tester Goes Interactive

MT. LAUREL, N.J. — Spectron Corp. has added interactive diagnostic capabilities to its Datascope series of portable test instruments.

The Datascope Model D-502 is essentially a D-501 microprocessor-based tester with an output buffer and an output instruction allowing interactive operation and program transfer through any standard modem to and from a tape unit, another D-502 or a communications line, Spectron said.



Spectron Model D-502

The D-502's additional features include display of the output buffer contents, buffer loading from a keyboard or the main buffer, buffer unloading to the line under program control and simulation of either a modem or terminal, according to a spokesman.

It can also simultaneously display input and output data streams and rerun programs directly on the contents of the main buffer, he said.

The D-502 costs $10,800 from Spectron at Church Road and Roland Ave., Mt. Laurel, N.J. 08057.

Data Briefs

Comdata Modem Provides Full-Duplex Transmission

SKOKIE, Ill. — The Model 212 modem provides full-duplex, synchronous or asynchronous transmission at speeds up to 1,200 bit/sec, according to the vendor, Comdata Corp.

Full-duplex transmission is achieved using the modulation technique standard on the 2,400 bit/sec Bell 201 series modems, the company said, adding both bandwidth and speed are halved to create two 1,200 bit/sec bands.

The Model 212 automatically switches from answer to originate and also provides autoanswer capability. A rotary test switch and seven LED indicators reportedly provide for system test and fault isolation.

The modem costs $750 from Comdata at 8115 Monticello, Skokie, Ill. 60076.

Portable Modem Tester Offered by Tele-Dynamics

FORT WASHINGTON, Pa. — The Model 7914B portable modem tester from Tele-Dynamics simulates communications control functions, evaluates system performance and isolates equipment failures, according to the firm.

The unit was designed for testing synchronous or asynchronous modems operating in simplex, half-duplex or full-duplex modes to determine the overall condition of a data channel.

The tester transmits a 511-bit pseudorandom test pattern and measures the bit error rate of the received signal. A two-digit display indicates the bit error count up to 99 and another indicator shows when the bit errors exceed 99, according to a spokesman.

The unit also generates mark-hold, space-hold and dotting patterns for performance evaluation purposes. Handshaking functions can be exercised by the tester and monitored on the front panel indicators, he said.

The tester costs about $700, the company added from 525 Virginia Drive, Fort Washington, Pa. 19034.

GE Apparatus Service Division Handling Adds, Vadic Gear

ALBANY, N.Y. — General Electric Co. (GE) has expanded its leasing, sales and service capabilities beyond its own Terminet printer line.

The company's Apparatus Service Division will now lease, sell and service Applied Digital Data Systems, Inc. (Adds) CRT terminals, Vadic Corp. VA3400 modems and a line of acoustic couplers.

GE can be reached at Suite 500, 80 Wolf Road, Albany, N.Y. 12205.

WUI Files to Expand DBS

NEW YORK — Western Union International, Inc. (WUI) has filed to extend its Database Service (DBS) to Belgium, France, Italy and Spain.

WUI expects DBS with the additional European nations to begin this spring.

According to the firm's tariff filing, DBS will feature the same volume-sensitive rates in the four countries as are in effect in the UK — a connection charge of $10 per hour and 50 cents per 1,000 characters of information transmitted.

WUI can be reached at 26 Broadway, New York, N.Y. 10004.

Set of Micros Suggested as Front End for Network

By Esther Surden
Of the CW Staff

SAN FRANCISCO — A set of microprocessors can be used to implement the process-scheduling function for each host CPU in a network as well as the usual network communications functions, according to Robert A. Pierce, computer analyst with SAI Comsystems Corp. of San Diego.

Speaking at a recent conference here, Pierce noted this approach differs markedly from the traditional front end that acts as a "dumb device."

The network operating functions are traditionally partitioned between the front ends and the host processors so network communications is handled by the front ends while peripheral management, process scheduling and control are handled by the host, he explained.

If each front end can become what Pierce dubbed a "process interaction controller" rather than a network communications device, the overhead of each host's operating system can be cut and the interprocess communications protocol can be standardized, he argued.

The approach can optimize the use of the host processors to make the network more economical, he said.

Microprocessors were chosen because they are inexpensive, he said, but added they also provide a degree of sophistication and flexibility.

Double Ring

According to Pierce, the research resulting in the use of a set of microprocessors derives from other research that developed a double-ringed, doughnut-shaped architecture for networks.

The double ring differs from the single ring in a fundamental manner, he explained. In the single ring, all network traffic circulates in one direction around the ring from each processor to the next. In the double ring, one ring is used to forward data while the other is used to return it.

Regardless of which architecture is used, he emphasized, the front ends perform traditional roles.

With a process interaction controller, the functions are divided into two categories: the interprocess communications function and the scheduling function.

The interprocess communications function acts as an interface between the process-scheduling function and the remainder of the network. It performs packet creation, aggregation, acceptance and output subfunctions.

The process scheduler acts as an interface between the interprocess communications function and the local host processor, Pierce said. It performs transaction-to-process mapping and process scheduling, he noted.

Process scheduling includes monitoring and controlling a task. It may be in any one of six states: awaiting allocation, being allocated, ready to run, running, suspended and completed.

Flexibility of Micros

One of the reasons microprocessors are well-suited to being the process interaction controller is their flexibility. Each micro "can support all of the process interaction controller activities, yet be a physically different device composed of standard electronic packages," he noted.

In selecting the microprocessor to be used, the amount of network traffic going through the front end as well as the host sophistication and the transaction workload should be analyzed, Pierce said.

The architecture selected should try to avoid processor saturation, he continued. For example, "in expanding ring and double-ring concept networks, total traffic will increase while any one individual host's workload might not."

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Places like Rio de Janeiro. Tahiti. Hawaii, Spain. An annual trip to places like these is just one of the incentives we offer our U.S. sales force.

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Basic/Four Corporation, a subsidiary of Management Assistance Inc. (MAI), manufactures and markets small business computer systems that are now being used in more than 3,000 locations throughout the world.

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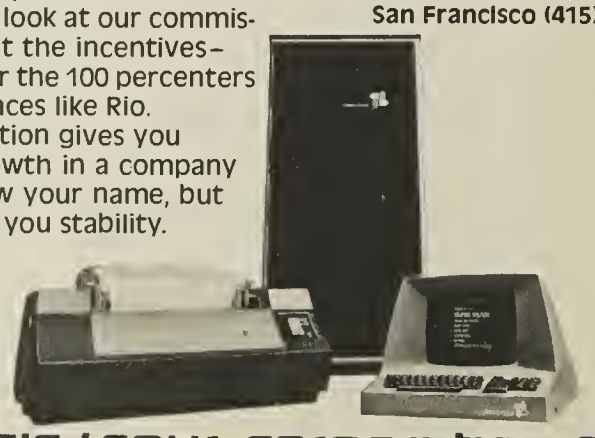
San Francisco (415) 348-8941



basic / four corporation
an MAI company

Syntest 'Fox Box' Tests Ascii Patterns

MARLBORO, Mass. — The Syntest Corp. SI-800 "Fox Box" is an Ascii test pattern generator aimed at modem, printer and CRT terminal testing.

The device generates the standard "quick brown fox" message in both parallel and serial form, with the parallel output consisting of the seven lines necessary for standard Ascii characters and a "data available" line. All parallel signals are TTL-compatible, the company stated.

Three serial outputs are provided: RS-232C, 20mA current loop and TTL signals. Both parity and the number of stop bits are switch-selectable, a spokesman added.

An internal bit rate generator is also controllable from the front panel. Transmission rates of 110- and 300 bit/sec are standard; an external clock can also be used, he noted.

Different messages as well as custom configurations can be provided, he said.

The Fox Box costs $395 from Syntest at 169 Millham St., Marlboro, Mass. 01752.

Preprocessing Ups Rate of Data Entry

(Continued from Page 29)

(MDL), a programming tool designed for off-line business processing.

Completed batches coming off the key-to-disk systems are subjected to several preprocessing routines before transmission to the home office.

The MDL routines perform editing and validation functions which otherwise would have to be done by the CPUs or by the key-to-disk processors themselves, concurrently with keying. Input centers batch-balance 100% of what they enter on the key-to-disk systems, but most of the logic checking is accomplished apart from the entry operation.

Key entry presently achieves nearly 100% accuracy; operator-created errors are usually caught in verify, and the MDS 2400 preprocessing pass catches the rest, such as faulty input data or field coding errors, Callanan said.

Operators Twice as Effective

At Liberty Mutual, preprocessing has not eliminated operator responsibility, Callanan noted. The key-to-disk operators get more involved through job format selection.

By keying the same source document under different formats, operators can enter transaction information as well as data base updates in one pass.

Operators can really accomplish two jobs at once because subsequent runs on the preprocessors will segregate and organize fields properly for central processing, he said.

Our high-speed, non-impact printer has just sharpened its teeth.

Now it's available in a lower-speed, lower-cost model.

Honeywell's Page Printing System will deliver up to 18,000 lines—that's 210 pages (11 x 8½ inches) a minute.

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And, since the Page Printing System works off-line, it can be used with nearly all IBM or Burroughs computers as well as Honeywell's. Without program changes.

The PPS prints from a continuous roll of paper. Pages can vary from three to 14 inches in length, and from 8½ to 11 in width. And since it cuts, punches, perforates, collates, stacks, and even applies addresses for mailing, all in one pass, you eliminate a lot of time-consuming handling and rehandling.

There's a variety of crisp, readable type fonts available. And when you need copies, you can forget about carbons. Every one is an original.

For still more facts and figures, write for our free brochure. And if you'd like us to arrange a demonstration, we'll do that, too. Your output tape or ours.

Sculpture, incorporating state-of-the-art CML computer circuit components, created expressly for Honeywell by Joe Veno.

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GE Device Supports RS-232C Peripherals

WAYNESBORO, Va. — A free-standing Terminet magnetic tape terminal (MTT) featuring character string search, 2,400 bit/sec data transfer and editing capabilities has been introduced by General Electric's (GE) Data Communication Products Department.

Available in either single- or dual-cassette configurations, the MTT is equipped with two RS-232C interfaces to accommodate a modem and a printer, CRT or other auxiliary device with an RS-232C interface, GE said.

The terminal can be used as a direct paper tape replacement or for off-line data preparation with a keyboard send/receive terminal.

It can also be used for 2,400 bit/sec on-line data transfer, local capture of data and off-line printout, data collection, local recording and storage and tape duplication utilizing the MTT dual-cassette unit, the company added.

An extended search capability does not require the prerecording of index codes on the tape, GE claimed.

Data block lengths of 88, 144 or 166 characters can be selected through a strapping option while data storage capacity ranges from 100,000- to 125,000 char./cassette depending upon the block length selected, GE said.

The complementary return to bias recording method used by the MTT was designed for synchronous character framed recording to neutralize the effect of dust and vibration in the working environment. This technique reportedly reduces the possibility of lost data that can occur using other recording modes.

The digital cassette is an Ansi-compatible 2.5 by 4-in. device with 300 ft of .15-in.-wide tape. Read/write rates are switch-selectable at 10-, 20-, 30-, 120- and 240 char./sec, GE said.

The Terminet MTT-1 single-cassette drive unit costs $75/mo to lease and is priced at $1,875. The dual-drive MTT-2 leases for $97/mo and costs $2,500.

The lease prices include maintenance; none of the prices include installation, GE noted from Waynesboro, Va. 22980.

Terminal Transactions

TI Adds Printer

HOUSTON — The Texas Instruments, Inc. Silent 700 Model 743 is a receive-only (RO) thermal printing terminal designed to interface with most terminals and mini- and microcomputer systems.

Said to feature microprocessor-controlled, buffered 300 bit/sec printing, the Model 743 has RS-232C and current-loop interfaces.

The printer is priced at $1,195, TI said from P.O. Box 1444, M/S 784, Houston, Texas 77001.

Tektronix Buffer Provides Editing

BEAVERTON, Ore. — Tektronix, Inc. has introduced an interactive buffer for its 4014 and 4015 models of graphic CRT terminals.

The buffer provides 1,023 bytes of off-screen storage which can be used as a straight buffer capable of storing or refreshing alphanumeric or graphics displays, Tektronix stated.

It also can be used as a text editor or in conjunction with thumbwheels or an optional joystick to provide moveable picture elements in a relocation mode, a spokesman added.

As a text editor, characters in the buffer can be displayed in a non-stored mode and deleted one at a time or simultaneously and rewritten, he said.

The interactive buffer costs $1,300. Tektronix can be reached at P.O. Box 500, Beaverton, Ore., 97077.

Ann Arbor Has Switch

ANN ARBOR, Mich. — Ann Arbor Terminals, Inc. Model 2480 CRTs are now available with a switchable interface option which reportedly provides for external switch-selection of either an RS-232 or 20mA current-loop interface.

Only one of the interfaces is enabled at any time, depending on the setting of the switch, Ann Arbor said.

Prices range from $1,130 for the controller to $1,780 for the terminal, the company noted from 6107 Jackson Road, Ann Arbor, Mich. 48103.

Who's Buying Microprocessors In Europe?

If you need to know you need to subscribe to Mini/Micro Market Monitor – the news and analysis bulletin of minicomputer and microprocessor market directions.

Write for sample copy: IDC Europa Ltd., 140–146 Camden Street, London NW1 9PF, England.

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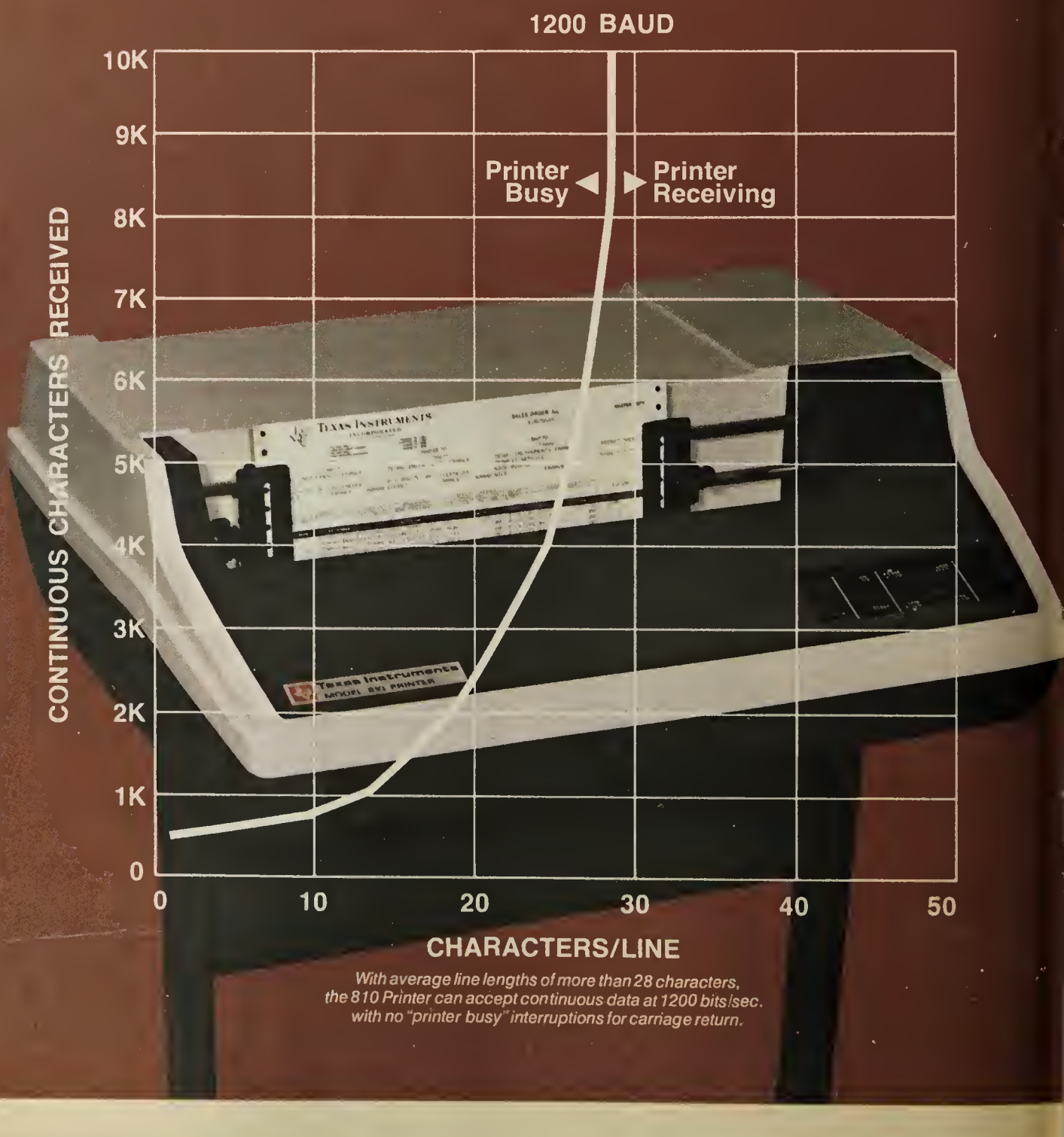
for those who need to know

New from TI.

Plot the performance of the Model 810 Printer against any other printer on the market.



With average line lengths of more than 28 characters, the 810 Printer can accept continuous data at 1200 bits/sec. with no "printer busy" interruptions for carriage return.

On-Line System Helps Spot High School Class Cutters

By John D. MacLean
Special to Computerworld

MONTEREY, Calif. — Faced with the problem of a three-week delay in notifying parents of student absenteeism and problems collecting absence information, Monterey High School here went to an on-line system to bring things under control.

The attendance-keeping problem was complicated by 1,500 students and a modular schedule which involves on- and off-campus courses, classes meeting from one to four 23-minute modules a day and classes meeting either every day or every other day.

Using the school districts' 96K Burroughs B1726 computer with 2K of control memory, two disk drives with a total of 200M bytes of storage, one TD 700 and two TD 800 terminals, the school now knows from period to period who is absent and notifies parents within a day of each student's absences.

Working toward the goal of reducing student absenteeism, the system provides the school with a daily list of absent students, which periods they missed and a weekly profile of each student's absences.

It also indicates problem areas such as which classes are cut most frequently, which grade level has the highest percentage of absenteeism, which modules are missed most frequently and in which multimodule class only one "present" was noted for the day for a student.

In addition, the system handles student scheduling and produces teacher class lists, student locator slips, class tallies and the monthly average daily attendance report used to obtain revenue from the state. The system is also linked to the school grading system.

Of the three terminals, one TD 800 is dedicated to keeping student schedules current. It can add and delete students, add and delete links from students to courses, mass add and mass delete students in a class, add new classes, change student and course information, inquire for class tally and inquire for a student's schedule which can be printed on the Burroughs teletypewriter connected to the terminal.

The other TD 800 is used to record the current day's absences and update past absences with reasons for absence; inquiry into past days' absences is also possible.

The TD 700 is located in the counselors' office and is used for inquiry of class tallies and student schedules.

The data base takes 3.5M bytes of disk storage. With the on-line program, the Burroughs Network Definition Language handler and the Version 6.0 operating system, the district still has 15K- to 20K of memory left for concurrent batch work.

The batch tasks are done with minimal interference to response time, which averages 2- to 4 sec.

In all, the system, written in Cobol, utilizing the Forte/2 data base management system, has 36 programs and can generate 16 different reports.

There were initial start-up problems which hindered operations, but they didn't cause loss of the data base. After four months of operation, the parallel manual system was dropped.

The system took one man-year to develop, test and implement.

MacLean is a programmer for the Monterey Peninsula Unified School District.

Terminal Transactions

Ruscom Controllers Extend Teletype Life

TORONTO — The Ruscom Logics Division of Multiple Access Computer Group has a buffered motor controller which is said to increase the life of Teletype Corp. model 33s and 35s.

The RMC 33 and RMC 35 are printed circuits designed to be mounted inside the teletypewriters.

The controller reportedly monitors the transmission line continuously, switching the motor on when messages are being received. The motor is automatically switched off after 10 seconds of no data, according to the firm.

In addition, the buffers in the RMCs hold the first characters of a transmission until the machine can accept them. Transmissions don't have to be modified in any way, the company claimed.

The units cost $160 each, the company said from 885 Don Mills Road, Toronto, Ont. M3C1W2, Canada.

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Compare the new Model 810 Printer with any other printer you are using or considering. We believe you'll find that the 810's reliable, microprocessor-controlled printing results in the highest throughput per dollar and lowest cost of ownership.

The 810 is ideal not only for OEM's but as a peripheral printer for the TI model 770 Intelligent Terminal and the 990 Mini/Micro Computer Family.

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The 810 printer has exceptional standard features too. Like bi-directional printing at 150 cps. No paper tape programming. Adjustable tractors for a variety of form widths. A 9 X 7 wire matrix character font for high-quality printing of an original and 5 copies. Bottom and rear paper loading. Speeds from 110 to 9600 baud. And 6 or 8 vertical lines per inch. Add to these the 810's tested reliability and the result is *performance*.

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With Vertical Forms Control, you get non-volatile storage of up to 8 different vertical forms. And with Forms Length Control, you can have 11 switch-selectable stored form lengths, from 3 to 14 inches plus 1 programmable form. The compressed printing option lets you print 132 columns in 8½ inch width. And foreign character sets are available as well as interfaces for most applications.

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A valuable feature of any Texas Instruments product is after-sale support. When you purchase your 810 Printer, you're getting support from a world-wide network of factory-trained personnel. And contracts are available for up to 24-hour, seven-days-per-week service.

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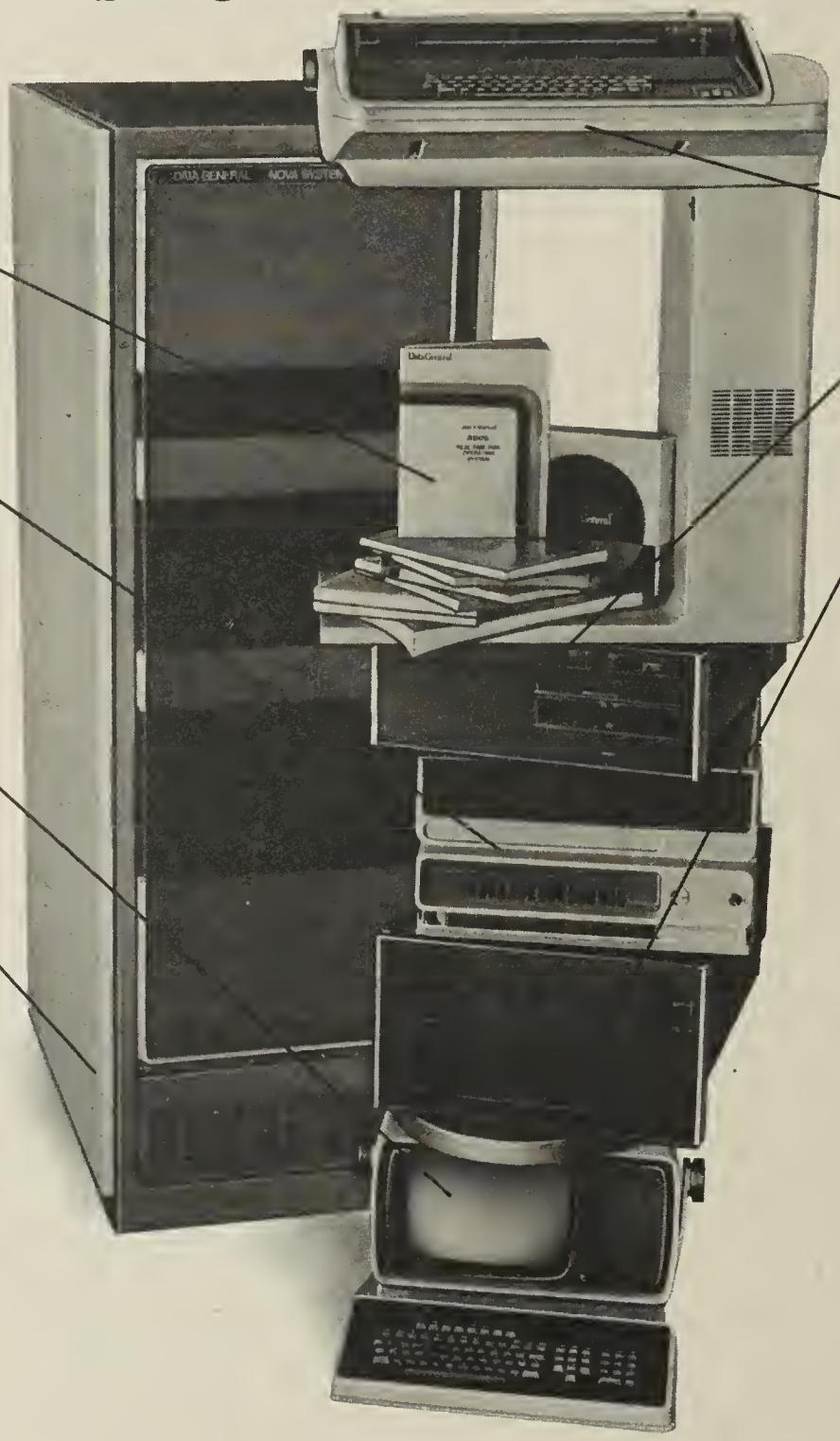
Here's how Data General's NOVA 3/D system stacks up against the competition.

Systems Software:
Multitasking real-time disc operating system, FORTRAN IV, Extended BASIC, ALGOL, SORT/MERGE, and Utilities.

NOVA 3/D Processor:
Hardware-protected dual partitions, 700-nanosecond arithmetic operations, 48K-word MOS memory with parity, RTC, and APL.

Video Display:
1920-character screen, upper/lower case characters, detached keyboard, numeric keypad, programmable function keys and character highlighting, display rotates on two axis.

Cabinet:
72-inch high, holds all rack mounted components.



DASHER
Terminal Printer:
60/30 cps; 132-columns; typewriter keyboard, upper/lower case.

Diskette Subsystem:
315KB for program/data interchange, diagnostics and software distribution; convenient, industry-standard offline storage.

Cartridge Disc Subsystem:
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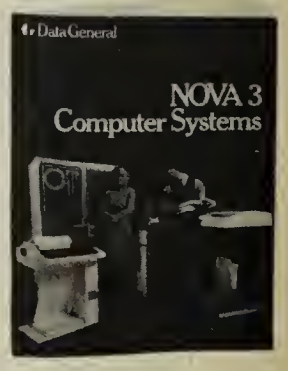

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Guide Helps Establish COM Costs

By Frank Vaughan
Of the CW Staff

BOSTON — For DP managers who are considering a move to computer output microfilm (COM), a guide to establishing hard-copy costs was published in the March issue of "Bank Auditing and Accounting Report" by Management Reports, Inc. here.

There are six major cost factors involved in the creation, storage and distribution of DP hard copy, according to the report.

These cost factors are the forms themselves; computer printer time; forms handling, including bursting and decollating; labor; forms distribution; and the storage and retrieval in active file space and inactive storage areas, including rent, equipment, personnel and ultimate destruction at the end of the retention period.

The forms cost can be determined by multiplying the number of forms used in the average run by cost per thousand forms, based on the last purchase price.

The average run length should be found in the DP production log, the report noted.

Users should multiply the average printing time by the current hourly charge for the computer printing operation, then multiply the hours needed for bursting, decollating and other forms handling operations by the hourly operating costs.

Multiply the number of binders and boxes needed to house the reports by the current price of these storage containers. The amount of containers needed should be available from the purchasing department, the report said.

Determination of records center and office storage costs should be obtained by multiplying the length of time the records are kept in these areas by the number of cubic feet needed.

Determine and multiply that figure by the cost of a cubic foot of storage.

The transportation costs should not be forgotten either, the report noted.

Multiply the number of cubic feet occupied by the hard copies by the contractual charges for picking up the records and transporting them to the records center.

Finally, multiply the number of cubic feet involved by the current per-cubic-foot destruction cost, the report concluded.

The monthly report costs $48 a year from Management Reports, Inc. at 210 South St., Boston, Mass. 02111.

Bits & Pieces

NRMA Issues Compendium Of Products Using OCR-A

NEW YORK — The National Retail Merchants Association (NRMA) has published a compendium of products and services using Optical Character Recognition-A (OCR-A), the general merchandise industry's voluntary retail identification standard.

This reference provides guidance in the use of the technology for voluntary universal vendor marking and store marking.

It gives both retailers and manufacturers a base knowledge of available marking and reading products or services to permit the selection of the option best suited to their individual data retrieval systems, according to NRMA.

Nearly 50 products and services are described in the compendium. An equal number or more are expected to be added in the next few months.

A year's subscription to the compendium, including the updating service for 1977, is $12 through NRMA, 100 W. 31st St., New York, N.Y. 10001.

AMA Plans Three-Day Courses

NEW YORK — American Management Associations (AMA) is offering two three-day courses — "Microfilm in Records Management" and "Developing Computer Systems for Accounts Payable."

The microfilm course will be held in New York, Chicago and Los Angeles, while the systems course will be held in New York, Chicago and Montreal.

Information on specific dates and locations is available from AMA's Management Systems Division, 135 W. 50th St., New York. N.Y. 10020.

NCR Offers Free 'Magic'

DAYTON, Ohio — An analysis of business forms requirements designed to pinpoint hidden problems and identify areas of waste is being offered free by NCR Corp.

The service covers not only NCR-supplied forms, but all types of forms used by the customer, according to a spokesman.

The service-media analysis, grouping, inventory control (Magic) — includes suggestions for improved forms design and methods to help customers better control their business forms.

Included in the survey are both computer-related and manual forms.

Information on Magic can be obtained from any district NCR office.

Correction

The IMS/90 information management system used by Potter and Brumfield ["On-Line System Brings Better Customer Service," CW, March 28] is from Univac.

Key Entry Speeds Credit Card Processing

RICHMOND, Va. — Increased speed and greater accuracy in processing credit cards are the chief results of United Virginia Bankshares, Inc.'s (UVB) switch to a key entry system, according to Barrett S. Crump, vice-president and operations officer.

UVB recently installed a Cummins-Allison Corp. 4400 Keyscan system consisting of two 96K processors, two 9-channel 1,600 bit/in. tape drives two 9.8M-byte disk drives, a 600 line/min printer, a card reader and 27 CRT keystations in a 13/13 unit configuration.

The UVB bank card operation here is charged with credit, collection, salvage, card issuance and processing of all types of media associated with BankAmericard, Crump said. In addition, the facility accepts Master Charge deposits, but does not issue that type of credit card.

The major work done on the bank card key entry systems involves merchant credit card deposits and cardholder remittances, Crump indicated.

Merchant deposits, reflecting purchases or cash advances, are routed through either a UVB or through an agent bank. All are processed through the bank card operation.

Operation Procedure

The UVB bank card operation receives a cash letter from each bank indicating the total amount of the transactions contained in a special double-windowed transmittal envelope along with the credit card medium.

The merchant's checking account is credited by the bank with the proper dollar amount.

Upon receipt at the operations center, the unopened merchant deposit envelopes are placed into a tray, with each tray or several trays representing a UVB or agent bank. Each tray has its own unique identification number and dollar control which is a carry-over of the amount indicated on the cash letter, Crump explained.

The trays then proceed to the data preparation area where the deposit envelopes are opened and the contents are prepared for processing. All items are microfilmed and each is assigned a sequential number. Microfilm records are maintained on file for seven years.

The deposits then move to key entry where the appropriate data is entered into the Cummins system, he said.

"Key entry is a production area," Crump said. "Our operators only enter the appropriate data that is requested. No corrections are made at this stage.

"The data entered at this point is stored on the disk and a listing of the contents of each tray is printed."

"Handling deposits in this manner enables us to achieve high production at the front end with key correct specialists settling merchant deposits at the reconcilement stage," Crump said.

"There's an added benefit from handling work in this fashion in that we can utilize personnel from other areas during peak seasons at our production stage since they only need familiarity with a 10-key pad adding machine and minimal instruction on the CRT," he said.

Key entry operators at UVB process bank cards.

"If we handled adjustments at the initial data entry stage, we would lose the flexibility that we have now," he noted.

Once the trays have been reconciled, the data is transferred from the disk to magnetic tape and onto the mainframe computer for processing to cardholder and merchant account, as well as transmission to other bank card centers through the National BankAmericard Base II System or to contracted banks for Master Charge items, Crump explained.

Cardholder remittances come directly to the UVB bank card operation. At data preparation, the remittances are sorted into four basic groups: full payments, regularly

(Continued on Page 38)

Firm Doubles 370/155 Capacity With Add-On Memory, PSE Unit

NASHVILLE, Tenn. — Two years ago, Life and Casualty Co. (L&C) here needed more capacity and increased throughput on its IBM 370/155.

Now, the firm claims to have doubled its on-line processing at a reduced cost by using a processor storage system and processor speed enhancement (PSE) unit from Electronic Memories & Magnetics Corp. (EMM).

Since L&C's 370/155 had only 512K of memory and outdated speed, add-on memory was forecast as the best solution to increase the volume of on-line transactions through the system's main files, according to Morgan Huff, vice-president of electronics for the firm.

Besides more capacity and increased throughput, Huff wanted reliability and IBM compatibility at a reasonable price.

His initial reaction was to purchase IBM memory, he recalled. L&C had good results with its installed 370/155 and compatibility would not be an issue with the purchase of add-on IBM memory.

After compiling the needed information on the IBM memory, Huff said he decided to match it against what the competition had to offer.

He investigated IBM-compatible equipment from several manufacturers, including EMM. From the information he gathered, he determined that capacity and throughput were standard.

User Satisfaction Noted

Even though reliability also seemed even, Huff's review of end users noted a general satisfaction with EMM equipment, he said. He also determined that EMM's add-on memory prices were 25% of IBM's.

L&C purchased EMM's micromemory 155 processor storage system with a PSE unit. An additional 1.5M bytes of compatible memory was added to the existing IBM memory.

The PSE reportedly extends the life of the 370/155 by allowing it to take advantage of the increased operating speeds available in EMM memories attached to the system.

The operating speed of the EMM memory is faster than the 2.1 microsec cycle time of the IBM memories supplied with the 370/155, because the EMM product is based on a standard memory module which operates at a 650-nsec full cycle time, Huff said.

Enough of this speed can be implemented to provide speed enhancement with in-

(Continued on Page 38)

Bank Handles Loan Stubs With a Mail Clerk, OCR

BURLINGTON, Vt. — The Burlingon Savings Bank here is having its mail clerk process loan payments in his spare time with an optical character recognition (OCR) system.

The bank would be classified as a low-volume OCR user. It previously used randomly selected teller stations as the source of batching, verifying and entering the loan payment data.

There had not been one specific individual assigned to process the loan payments received through the mail.

The bank found OCR to be an effective method for reliable data entry. Because of its cost, however, Lyman W. Hill, group vice-president of the bank, said he could not cost-justify any of the systems he had been looking at for the past three years.

After seeing a demonstration of the Keytronic Corp. M3 OCR system and noting no additional forms were necessary to implement it, Hill purchased it. The only changeover Burlington experienced was to relocate the loan forms' information scan band, consisting of the previous billing information, just below the spot where the previous billing information was printed.

No Degradation

The OCR system is interfaced to a 3277 Genesis CRT with a Genesis 1 keyboard that is plug-compatible with an IBM 3271 control unit and a 370/135 CPU. The bank is currently reading a 407 font generated by an IBM 1403 printer and reported no degraded print reading problems.

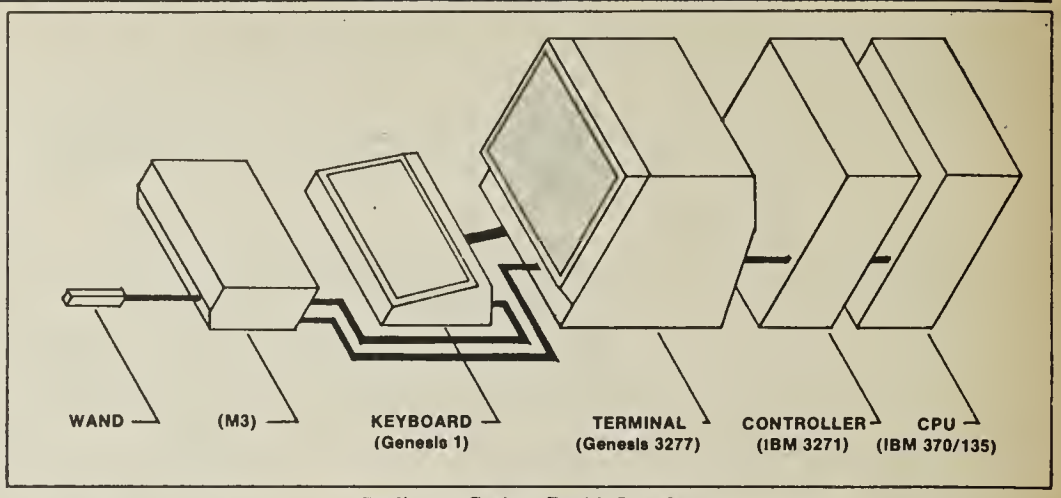
In a sense, the system is operating on-line. The CRT holds 24 documents on the screen at one time; after the documents have been entered into the screen format, the information is sent to the CPU. It can be recalled for manual editing if necessary.

As a result of implementing the OCR system, overtime costs have been eliminated for this application, Hill said. Rather than having the responsibility of processing these payments shifting from one person to another, Burlington's mail clerk can handle the processing load during a normal work day, he added.

The number of documents processed each day at Burlington varies from approximately 1,500 per day at the beginning of the month to 400 daily at the end.

The M3 has been at work for four months now. It will pay for itself in the first 12 months of overtime because of the operator overtime eliminated, Hill said.

No additional hardware was necessary to implement the OCR system. Burlington had the system up and running with a minimal amount of effort in writing the custom software it desired in order to perform special functions within an eight-week delivery time frame, Hill concluded.



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Firm Goes Directly From Paper Tape to Distributed Net

STAMFORD, Conn. — Most companies gradually evolve their DP into distributed operations, but the F.A.G. Bearing Co. here made the move by taking one step from information on paper tape collected by mail to a distributed data entry and processing system.

The distributed network idea looked like it would never become a reality for a while, according to Tom Conti, F.A.G. Bearing's DP manager.

"We were given a budget figure when we began looking at equipment for the project, and I wanted to get a mini for the plants that would work with RPG-II.

"Our headquarters shop is an RPG-II shop and we package all the applications that are sent to the plants," Conti said.

"Prices for systems that would handle RPG-II were just completely out of our budget range," Conti explained. "All the systems we looked at started at $4,000 per month for one site.

"We were about to give up on the distributed processing idea until we could get more budget money, when we saw the Sycor Corp. 440 which leased for one quarter that amount.

"We particularly like the TAL II language, its ease of formatting the display screens for our operators and the other capabilities it offers," he noted. "We also like the 10M-byte disk capacity and the 10M-byte expansion available when we need it.

"The clincher, however, was the price," Conti said. "We installed all four sites, the plants and headquarters, for what we would have paid for one site using other distributed processing minis.

"The only thing that we had to give up was a little processing speed," he added.

The Sycor 440s are located here, in Toledo, Ohio, and in Joplin, Mo. They are being used to gather data for billing and payroll operations and will soon provide input for inventory control, he said.

Savings Justified Cost

Conti also pointed out that savings on the billing system alone justified the cost of the terminals. Some entry stations on the Sycor replaced two of the old key to paper tape units.

"Payroll for the plant in Joplin was being done at a service bureau. The Sycor system brought that in-house, resulting in additional savings.

"The inventory control system will be completely new, but any one of these applications could justify the cost of the terminals by itself," Conti said.

"With all four systems we reduce paperwork and card handling. The number of people handling customer orders and payroll information has been reduced and this reduces the chances for errors and makes us more efficient."

Billing and Payroll

Billing and payroll are running now at F.A.G. Bearing. Orders for custom built bearings are normally taken on the phone by salesmen who know customer needs. The salesmen translate the complicated bearing orders into a form that the Sycor terminal operators can understand.

The operators then enter part numbers on the components for each customer order. As the information is keyed onto the terminal's 576-char. CRT, the 440 checks to see that the parts do exist. Customer information as well as shipping and some pricing data is also verified as the operator completes the order.

Information from all three plant 440 terminal systems is collected on a dial-up basis at 2,000 bit/sec over Wats lines by the 440 at headquarters where it is recorded on magnetic tape.

The tape is physically moved to the company's Honeywell 62/60 computer, Conti said.

With the payroll system, the terminals are used for entry of employee work data as well as the printing of paychecks. At the plants, operators enter information from employee work sheets on the hours worked, overtime, shift premiums and other variables, he added.

The information is sent to the Sycor 440 at the corporate headquarters here, recorded on magnetic tape and moved to the CPU. There the data is used to update payroll records, and then all information for each employee's check is recorded on tape, he explained.

The tape is fed back into the system and data is transmitted to each plant.

There the 440 receives the check information and prints the paychecks for plant workers on the terminal's printer at 120 char./sec, he added.

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Unit Prints 9,600 Label/Hour

NORTHRIDGE, Calif. — Instrumentation Technology Corp. has a printer that produces 9,600 grocery-shelf labels per hour.

The Model 9537 allows four character sizes to be intermixed on a given label; font selection has no effect on print speed, a spokesman claimed.

The 2- by 1-1/8-in. labels can contain the user's choice of information, ranging from price to bar codes, he added.

The Model 9537 consists of a magnetic tape unit, a printer, a tape formatter and an interface controller. Label data is input from the user's system to the magnetic tape unit and applied to the printer through the interface unit.

Interface Unit

The interface contains all system logic, line buffers and code conversion logic.

The device may also be used as an off-line 300 line/min printer or plotter, the firm said.

The Model 9537 costs $34,000, including necessary software, installation and customer training, from the firm at 18333 Eddy St., Northridge, Calif. 91324.

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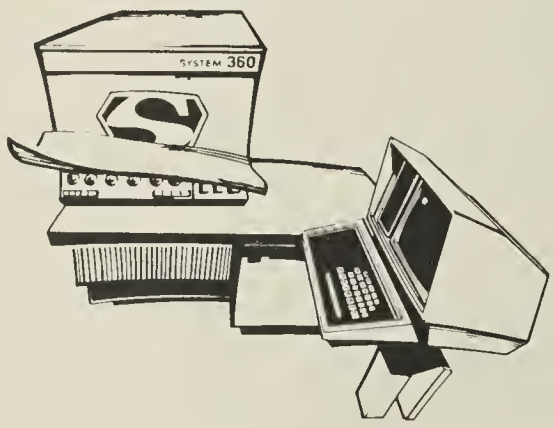

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Synchronous Tape Transport From Tandberg Features Micro

SAN DIEGO — A microprocessor-based synchronous tape transport with an optional internal formatter that permits users to daisy-chain up to four transports has been introduced by Tandberg Data, Inc.

The TDI 1050 utilizes two 10-1/2-in. reels and reads or writes data at densities of 1,600 char./in. phase-encoded or 800-, 556- and 200 char./in. at speeds of 12.5- to 45 in./sec, with an average rewind speed of 200 in./sec.

The transports can be used for either 7- or 9-track tape, the firm said.

Full editing capability permits selective record updating of prerecorded tapes and prevents extraneous signals from being recorded in the interrecord gaps, the firm claimed.

The built-in microprocessor was designed to reduce customer operating costs, it added. IBM and Ansi capability is provided.

The transport costs $2,990; OEM pricing is available. Deliveries will begin in July, Tandberg said from Suite 407, 4901 Morena Blvd., San Diego, Calif. 92117.

MFE Serial Interface Fits 250B Transport

SALEM, N.H. — MFE Corp. has a serial I/O board, Option 204SER, that provides a universal interface for its Model 250B digital cassette transport.

The I/O board is for all applications in which the user's interface or data stream is already in serial format, such as data communications or data acquisition.

Option 204SER replaces three current encoder/decoder options: biphase level, biphase mark and biphase clock. These options are still available on a limited basis, MFE noted.

The serial I/O option includes four speed control oneshots, allowing programmed selection of read/write, search, low rewind/fast forward (80 in./sec) and high rewind/fast forward (120 in./sec); adjustable write oscillator for write clock generation; optical EOT/BOT latch; IRG gap detector; and biphase-level encoder/decoder circuitry to provide Ansi/Ecma-compatible recording at data rates up to 32,000 bit/sec.

The Option 204SER plugs into and becomes part of the Model 250B, adding about 1 in. to its depth. The I/O connector to the user interface is a 40-pin, 3M-type 3432.

The Serial I/O interface costs $150; OEM discounts are available from the firm at Keewaydin Drive, Salem, N.H. 03079.

Security System Gets Card-Activated Unit

GLENDALE, Calif. — Rusco Electronic Systems has added the MAC520 card-actuated security access control system to its Cardentry System 500.

The MAC 520 is a self-contained unit with the programming capability of a multistation system utilizing central controllers, the firm said.

It uses a 6800-series microprocessor with solid-state memory and keyboard programming and stores up to 168 identification card numbers.

Numbers can be entered, deleted and assigned time-zone status by inserting a programming card in the reader slot and entering commands on a keypad on the unit's front panel, Rusco said. An LED display verifies keyboard entries.

The keypad serves a second function with the Idek option. This requires each cardholder to memorize a four-digit personal code which must be keyed in after his access card is inserted.

The unit costs under $1,500 from the firm at P.O. Box 5005, 1840 Victory Blvd., Glendale, Calif. 91201.

Key Entry Speeds Card Processing

(Continued from Page 35)

scheduled payments, odd-amount payments and those items classified as "junk."

The prepunched payment card and check are microfilmed with each item assigned a sequential reference number. The checks and payment cards are then separated into batches with each batch having its own unique number.

Payment cards are processed by the Cummins card reader which enters the 13-digit cardholder account number and dollar amount of the payment for full or regularly scheduled payments.

In instances where the payment is odd (does not equal full or regularly scheduled payment), the actual dollar amount is key entered after the batches of cards have been read and stored on disk.

"With the card reader, the majority of our remittances are handled with no key entry work. For those requiring keying, it is usually only four digits for dollar amounts since the card reader has entered the cardholder's account number," Crump said.

A listing for each batch is then printed and transferred with the payment cards back to the remittance area for verification of batch totals.

Remittance checks, after being separated from the payment card, are processed through a Burrough's Corp. document encoder with the dollar amounts recorded in magnetic ink and totaled for each batch of checks, Crump stated.

Batch totals between checks and payment cards are verified at this time with prequalified checks forwarded to UVB's central check processing facility for normal processing.

"In 1975, we processed more than 6,167,000 items with a staff of 70 full-time and 12 part-time employees," Crump indicated. "One year later, 50 full-time and 7 part-time employees processed over 7,929,000 items on the new system.

"That's a 28% increase in volume processed by a 30% smaller staff, and we attribute a major portion of that improved productivity to the Cummins system," he said.

"Some of our associates in the banking business thought we were crazy for installing a new key entry system on the threshold of our peak season, but we had confidence in the Cummins system and the support of its personnel," Crump said.

"We encountered a few start-up problems, but the Cummins people gave us superb support," he added.

Add-On Memory Ups Firm's 155 Capacity

(Continued from Page 35)

creases in computing capability, according to an EMM spokesman.

In a post-installation evaluation of the EMM hardware, Huff noted the installation itself had been easier than planned and the throughput and performance of the add-on were as expected.

Instead of 50% utilization of the 370/155's capabilities, Huff noted a current level of 85% with EMM.

On-line transactions have doubled from the previous 200,000/mo and the reliability has been as expected, he said.

In addition to the 370/155, L&C DP center includes an IBM 360/40, a Terminal Communications, Inc. teleprocessing network and a Quantor Corp. computer output microfilm unit.

Options Increase for Users in Search of a Mini

•SEL Adds Large CPU

FORT LAUDERDALE, Fla. — Systems Engineering Laboratories' (SEL) 32/75 pushes the range of the minicomputer upward, according to the firm.

The SEL 32/75 spans the performance range from the Digital Equipment Corp. PDP-11/70, Harris Corp. Slash 6 and Interdata 8/32 on its low end to the Decsystem-20 on its high end, the firm claimed.

Designed for high-speed computational, energy management and other "number-crunching" applications, the 32/75 is software-compatible with the other members of the SEL line, a spokesman noted. All peripherals used on other SEL systems can be used on this one, he added.

Users of the SEL 32/55 can upgrade to the 32/75 for an undetermined price, the firm said. Upgrading would include several board changes.

The 32/75 features a CPU based on a high-speed SEL bus with a 26M byte/sec throughput rate. Slower memory and I/O buses are attached to the faster bus, the spokesman said.

An optional writable control store allows users to tailor the system for their needs, SEL stated.

Along with the 32/75, the firm introduced Regional Processing Units, (RPU), intelligent controllers that can accommodate up to 2K of programmable read-only memory (Prom) and 4K of random-access memory (RAM), offloading the CPU. The instruction execution time with the RPUs is 150 nsec, SEL said.

Memory for the system is in 32-bit words of 600- or 900 nsec nonvolatile core. Memory can be expanded in 32K-byte increments for the 600 nsec version or 64K-byte steps for the 900 nsec memory. The system can accommodate up to 16M bytes of memory.

An optional high-speed floating-point processor was also introduced. The processor features 1.95 microsec add times for 32-bit words and 2.6 microsec for 64-bit words.

Floating-point multiply times are 3.95 microsec for a

(Continued on Page 40)

•DEC Goes Industrial

MAYNARD, Mass. — Digital Equipment Corp. has announced a line of systems designed for industrial plant management in manufacturing and process environments.

Based on the firm's PDP-11/34 and PDP-11/70 minicomputers, the Distributed Plant Management (DPM) systems are intended for use in an integrated network to perform functions ranging from data collection to process control, DEC said.

Introduced were the DPM 60 and DPM 80 systems, three factory data collection terminals, a local measurement and test subsystem to be used with PDP-11-based hosts and a link to connect a host PDP-11 with remote data collection and control points up to 15,000 feet away.

The DPM 60 includes a PDP-11/34 mini, cartridge disk storage and two serial bus controllers. The DPM 80 includes a PDP-11/70, disk cartridge or larger disk pack storage and four serial bus controllers. Both systems are supplied with Cobol and Fortran IV running under DEC's RSX-11M operating system.

The three factory data collection terminals introduced were a time and attendance station called the RT-801 for employee entry/exit recording; a basic workstation, the RT-803, for single activity reporting; and an area workstation, the RT-805, with numeric keypad and a 32-character alphanumeric display.

All of the units are ruggedized for factory environments and contain power supplies, interfaces and control electronics, DEC said.

The Decdataway data link is a two-conductor twisted cable that can extend up to 15,000 feet from the host system. It serves as a bidirectional data path for a host and up to 63 multidropped remote devices such as data collection terminals, full-keyboard CRTs or printer terminals and a monitor/control subsystem.

The Decdataway affords "position independence" for all remote devices, allowing them to be interchanged or moved

(Continued on Page 40)

•Qantel Has Supermini

HAYWARD, Calif. — Qantel Corp. has introduced what it called a supermini for first-time users.

The Model 1400 CPU, available in two configurations, is in the performance range of the Digital Equipment Corp. PDP-11/70 and Data General Corp. Eclipse, Qantel claimed.

The 1400 is software-compatible with the firm's smaller 900 series and users of the 900 can move to the 1400 with the purchase of a CPU upgrade kit costing $13,950, Qantel said.

The kit includes an upgraded CPU, power source and card cage. The 1400 series peripherals then must be added, a spokesman noted.

The 1400's CPU is four times faster than the CPU on the 900, Qantel said. It accommodates 96K bytes of memory compared with the 900's 64K-byte maximum and uses a multibus architecture with 11 direct memory access channels, base registers and a stacking capability, the spokesman added.

The two 1400 series models introduced both use the enhanced CPU. The basic 1400 has 8K bytes of memory, 12M bytes of disk storage and a 300 line/min printer; the 1400-2 basic system has 16K bytes of user memory, 25M bytes of Winchester-type disk storage, two CRTs, a 45 in./sec magnetic tape unit and a 300 line/min line printer.

Both units are expandable, Qantel said. Up to 96K of user memory, a real-time clock and data communications capabilities can be added to the CPU; the system will accept up to 64 terminals, the spokesman noted.

Multiple printers as well as up to four tape drives can also be added, the company said.

The 1400-2, in addition, uses a fixed, sealed disk drive featuring Winchester technology. The 1400-2's disk controller supports up to four disk drive units, including either a standard 25M-byte version or a larger 75M-byte version.

The drives can be intermixed on a single controller and up

(Continued on Page 40)

Survey Finds Vendors' Hardware Support Varies

By Esther Surden
Of the CW Staff

PENNSAUKEN, N.J. — Buying a minicomputer on the basis of hardware and software alone is at best "precarious," Auerbach Publishers, Inc. believes, so it surveyed minicomputer vendors on their support and service policies.

The results indicated all the vendors surveyed handle software support in much the same manner, but differ widely in their hardware support and service policies, Auerbach said.

Before and After Installation

Auerbach's report on the survey covered services both before and after installation of equipment including hardware maintenance contracts, software maintenance practices and educational programs. Eleven minicomputer vendors representing specific systems operating under particular software were contacted.

Those surveyed were Data General Corp. with the Nova 3 and Eclipse S200 under MRDOS; Digital Equipment Corp. and its PDP-11/40 operating under RSX-11M; General Automation, Inc. with the GA 440 under Control IV; Hewlett-Packard Co. and the HP 9640 under RTE-111; Honeywell Information Systems, Inc. and the Level 6/36 under Gcos/BES; Interdata, Inc. with the 7/16 under OS/16-MT-2; the IBM System 7 under MSP/7; Modular Computer Systems (Modcomp) and its Modcomp IV under Max IV; Prime Computer, Inc. with its Prime 200 under RTOS; Texas Instruments, Inc. for the 990/10 under DX-10; and Varian Data Machines with the V76 under Vortex II.

Only six of the manufacturers will both sell and lease their products. HP and TI seem to have the most flexible leasing policies, the report said, and are "willing to accommodate the leasing requirements" of the user.

IBM and Prime are the only companies that give an allowance for old equipment to users who upgrade within the product line. IBM, DEC and Modcomp "will sell reconditioned or used equipment to customers," the research stated.

Although most of the vendors will not sell OEM-designated equipment to the end user, DG and DEC will if specifically requested, the report noted.

HP will help users set up the installation, assisting in such things as physical planning and facility preparation.

Modcomp checks out new installations with applications programs, diagnostics and systems programs; this "is a rarity among the minicomputer manufacturers," Auerbach said.

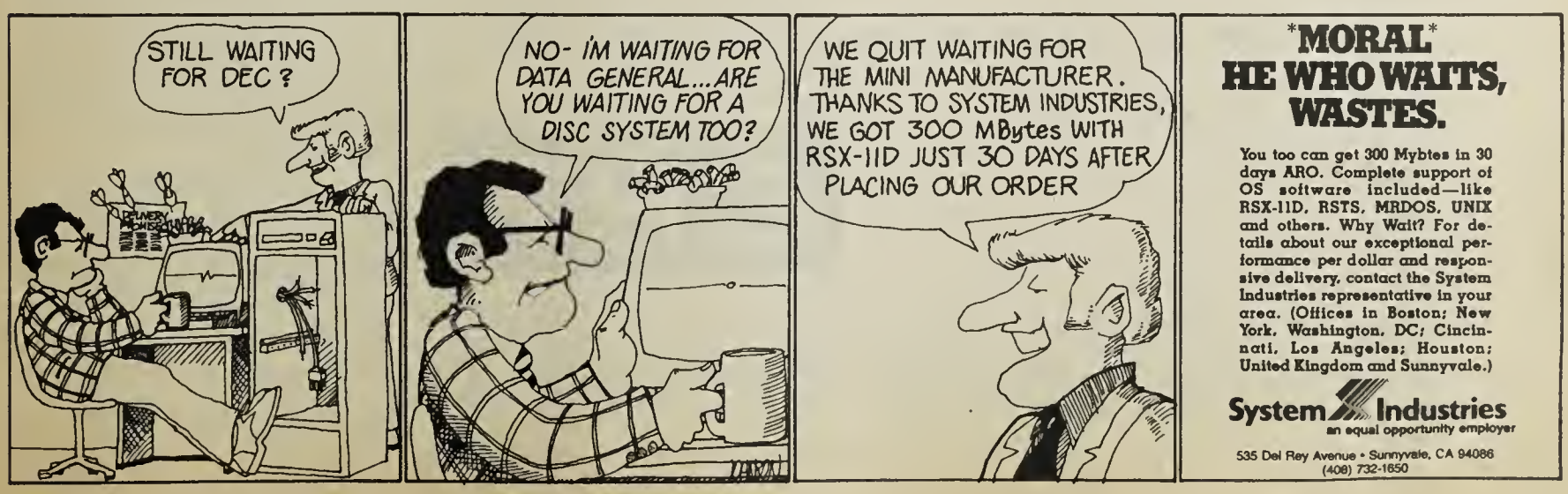
IBM is the only one of the vendors that will not offer maintenance education to users, a policy that could be an important consideration to potential users, the report noted. "Many minicomputer customers prefer to maintain their systems themselves," Auerbach said.

Only three of the vendors are willing to provide maintenance for an OEM device from another manufacturer, the report continued. DG, DEC, Modcomp and Varian will allow users to use software under development if the user maintains confidentiality, the survey noted.

Loaner Parts

Both DG and Prime will provide loaner parts while the user's hardware is being repaired, the report noted. The survey reflected the announced corporate policy of the vendor, Auerbach stated, and ad hoc arrangements between individual customers and sales/service personnel may differ from corporate policy, which usually represents the least a company will do for a user.

The complete report is available for $89 from the publisher at 6560 N. Park Drive, Pennsauken, N.J. 08109.



Board Gives PDP-11 Four More Channels

SANTA ANA, Calif. — Able Computer Technology has developed an interface board which reportedly gives Digital Equipment Corp. PDP-11 users four asynchronous EIA series communications channels but presents only one load to the PDP-11 Unibus.

Able's Quadrasync is software-compatible with the DEC DL11B and DL11D, but has relatively little need for bus repeaters and expansion boxes to increase the number of available channels, the firm claimed.

Quadrasync operation is full duplex with both the transmitter and receiver for each channel operating at the same transmission rate. There are seven independently selectable transmission rates per channel ranging from 150- to 9,600 bit/sec, Able said.

The Quadrasync costs $1,600 or $400 per channel, according to the firm at 1616 S. Lyon St., Santa Ana, Calif. 92705.

Turnkeys Based On Series/1

E. PROVIDENCE, R.I. — What may be the first in a long line of systems based on IBM's Series/1, introduced last year, has surfaced from Span Management Systems.

The turnkey systems were designed for both distributed processing applications and business data processing, Span said. Software is written in Macro Assembler language.

A 32K system with a CRT, 9.3M-byte cartridge disk, 122K-byte fixed-head disk, 606K-byte floppy disk, 120 char./sec bidirectional printer with operating software and utilities as well as $5,000 worth of applications programming can be rented for $1,167/mo.

Span is located in Westminster Industrial Park, E. Providence, R.I. 02914.

Qantel Has System for Novices

(Continued from Page 39)

to two controllers can be added to the system for a total capacity of 600M bytes, the firm stated.

The intelligent disk controller handles much of the "housekeeping" work required by disk data storage and retrieval, Qantel said. It includes 16K bytes of its own storage and a microprocessor which manages a stack of 15 disk sectors of 768 bytes each.

Voice Response

The company also announced a voice response capability for the 1400 system that allows the user "to record whatever voice desired," according to the spokesman. Programmed in the firm's standard programming language, Qicbasic, the capability operates under the Business Executive System for Time-Sharing (Best) operating system. The voice response unit costs $3,900 for two communications lines.

In addition, Qantel announced a report generator software package for the 1400 that "enables customers to request and receive special demand reports."

Specialized Reports

The report generator uses a question-and-answer type of dialog so users with no programming knowledge can get specialized reports, the spokesman said. The feature costs $1,950.

The report generator is based on a feature "built in" at no charge to the 1400. Called a program generator, it performs many of the repetitive tasks normally required for applications programming to "reduce the skill level required of a programmer," Qantel said.

The basic 1400 system costs $43,900; the basic 1400-2 costs $64,900. Qantel can be reached at 3525 Breakwater Ave., Hayward, Calif. 94545.

DEC Develops Duo For Industrial Use

(Continued from Page 39)

to other locations along the cable, the company claimed.

A serial bus controller acts as a link between the Unibus of the host and the Decdataway. It is a type of front end to the PDP-11 processor, the firm explained, and emulates a direct memory access channel for each unit connected to the bus.

Frees Host

The controller frees the host processor from communications functions including framing, retries and sensing device failure, the firm said.

The 1P11 bus converter, also introduced, is a single-box configuration that allows the announced terminals to be used on PDP-11 systems without the Decdataway. The converter will link up to 78 I/O modules to the PDP-11 Unibus, DEC said.

A typical DPM 60 configuration with a 192K-byte PDP-11/34, floating-point arithmetic, RK05 or RK06 disk drives and two serial bus ports costs $76,850.

A basic DPM 80 with a PDP-11/70 and 256K bytes of memory, floating-point arithmetic, RK06 or RP06 disk pack drives and four Decdataway controllers is priced at about $160,400.

The RT-801 costs $3,500; the RT-803 costs $6,400; and the RT-805 costs $8,450.

The Decdataway is configured from standard cable with controllers at both the terminal and the host. The controllers are bundled, so there is no set charge; users only have to pay for the cabling, a spokesman explained from the company in Maynard, Mass. 01754.

SEL 32/75 Pushes Mini Range Upward

(Continued from Page 39)

32-bit word and 5.6 microsec for a 64-bit word, the company claimed.

A full 32/75 with 1M byte of main memory, 300M bytes of disk, magnetic tape, 1,000 card/min card reader, 600 line/-min printer and an operator communications device costs $220,000.

A basic 128K-byte CPU with interfaces for a line printer and card reader and space for 524K bytes of 900 nsec memory is priced at $64,200.

Floating Point

The floating-point processor costs $6,000; the writable control store costs $10,000 for 2K 64-bit words; and the RPUs, also optional, range in price from about $5,000 to about $15,000 depending on the amount of memory.

With both 2K of Prom and 4K of RAM, the RPU costs about $15,000, SEL said.

The operating system for the 32/75 is also unbundled. It costs $1,500, SEL noted from 6901 W. Sunrise Blvd., Fort Lauderdale, Fla. 33313.

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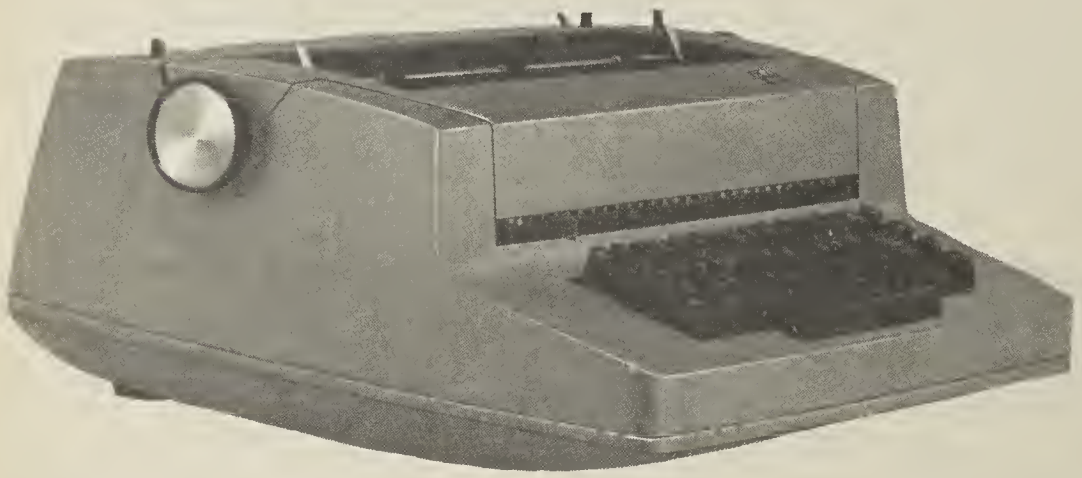

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Population Balloons on Weekends

Small Systems Control City's Entertainment Seekers

By Esther Surden
Of the CW Staff

GLENDALE, Colo. — Two small business systems are helping the police and city administration here keep control over a population that swells to 25 times its normal size each weekend.

Glendale is surrounded by the City of Denver and handles one industry — entertainment, according to Councilman Tim Greer. On weekend nights, the population can balloon from 3,000 to 75,000, he noted.

Although control was a motivation for getting the systems, lack of space was another, Greer said. The city wanted some way to store its records in less space and turned to a small system combined with microfilming to do this. All records are microfilmed after processing is completed.

"We originally ordered an IBM 3/8," Greer noted. However, studying this system showed "we could make better use of two System 32s" because the systems offered more on-line storage.

The city could have 15M bytes on-line with the 3/8, while with the 32s it could get 27M bytes on-line, he said.

The city looked at both Burroughs and IBM before it went with the IBM, Greer said.

'Innovative' Programs

One of the systems handles water utility billing, payroll sales tax accounting and accounting for Glendale, he noted.

The programs are "innovative," he added. The sales tax system, for example, does the fining, the figuring and issues the forms to be filled out.

The court system tracks a ticket from the day it arrives at City Hall until it's taken care of, he said. The city uses ticket books with 25 tickets in them. When the books arrive from the printer, the system logs the beginning number and automatically assigns tickets to the books, Greer explained.

The system also puts out a turnaround document for the officer. When the tickets are given, the officer informs the administration by sending a turnaround document.

If, for example, 24 tickets come back and the 25th doesn't come back for three months, the system can keep track of it. It also assigns docket dates and gives a printout of each case, Greer said.

The turnaround document even goes to the judge and a record is kept for each court appearance. If a case accidentally gets to a different judge than the one that has been handling it, the new judge already has a record of all the transactions, Greer said. "The judges love it," he commented.

Utility billing used to take three days. Now it takes a half hour to enter the data and three minutes to print the bills, he said.

Monitors Police Calls

The second system at the police department monitors all the calls received. Anytime an officer is sent, the system receives a crime report.

With the crime report entered into the system, police administration can get information on problem locations and problem times-of-day to determine the most efficient assignment of manpower.

It also keeps track of the liquor licenses, Greer noted. Since the town is particularly geared towards entertainment, keeping tabs on establishments coming up for license renewals is very important and becomes a tool in keeping any troublemaking element out of the city, he said.

The fire department files are also on the system, which allows the department to allocate its resources more efficiently, Greer said.

An on-line program lets officers, through the dispatcher, look up the last four arrests of a suspect. Security has been an important aspect of this program, he continued, with only certain people assigned codes to allow them to change information in the files.

"Your job responsibility gives you an identifying number," he noted, adding if "you don't know the proper code, you can't get into the files."

About 15,000 arrest records are on-line, he said.

The systems cost the city about $70,000 for hardware and the software development effort cost approximately $30,000, he stated.

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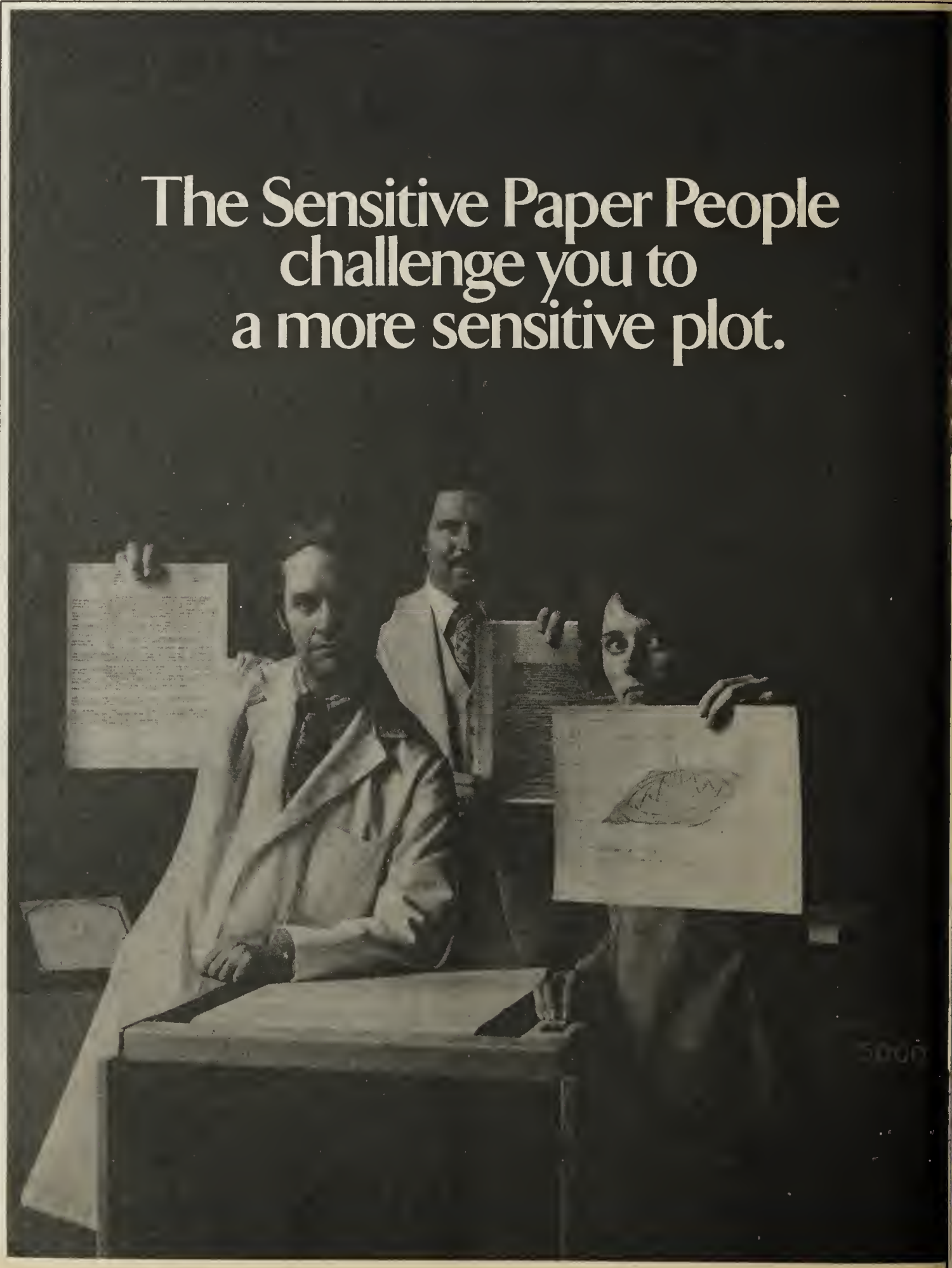

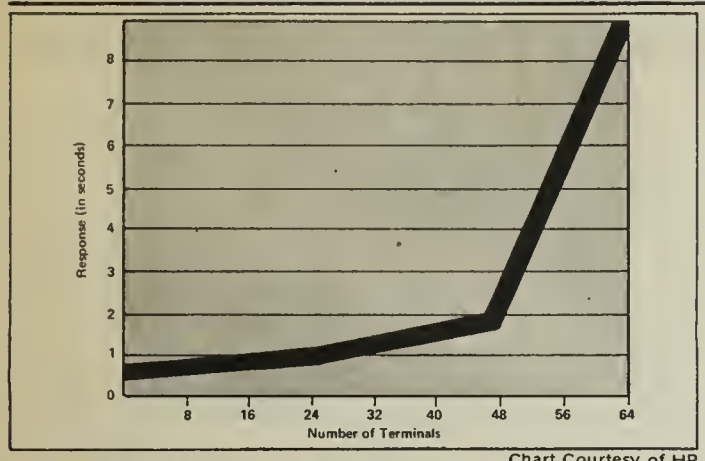

Chart Courtesy of HP

The chart shows a dramatic increase in response time when more than 48 terminals are added to an HP 3000 Series II using Image and Cobol.

Tests 3000 Series II

HP Gives Users Idea of CPU Capability

By Esther Surden
Of the CW Staff

SANTA CLARA, Calif. — "One of the difficult tasks for the computer system purchaser is to determine if the proposed system will actually perform the intended application," according to a Hewlett-Packard Co. brochure.

So HP performed a series of tests on one of its systems that it claimed "were designed to be realistic and were not structured simply to show the system advantageously."

The tests were not intended to be a challenge to other vendors, Bill Krause, marketing manager of HP's General Systems Division, said in a recent interview here.

Instead, they were intended to give users some idea of the performance they can expect when buying the firm's HP 3000 Series II system.

The tests were conducted at the General Systems Division here. "To simulate the terminals and measure performance, a system known as a Terminal Event Performance Evaluator was used. This is a stand-alone computer which can simulate large numbers of terminals," HP explained.

The evaluator was connected to a terminal controller so the system was unaware it was not connected to real terminals, the firm noted.

Five Tests Run

Five tests were conducted, ranging from the simulation of a small business doing mainly batch work to the simulation of a large corporation's manufacturing division with a heavy load in a mixture of batch and terminal work.

Response time was defined as the time between hitting the carriage return on an input line and the appearance of the next prompt at the terminal. The results showed "the average response on all the terminals for all transactions except log-on and log-off."

The measurements were taken over "at least" a 30-minute period, HP added.

The terminals ran at 2,400 bit/sec in character mode, HP said. Typing speed was simualated at 3 char./sec and user think time was introduced.

In each test (except one testing applications mainly written in APL), the system compiled and prepared a 353-line RPG program, executed a program to print a 120-line report, sorted a 10,000-record file by three keys, compiled and prepared a 600-line Cobol program and executed a Cobol program to produce a five-page report.

HP ran the jobs repeatedly throughout each test and calculated throughput in terms of "job/hour." Noting that users have different configurations, the company said that when running stand-alone on a 512K-byte system with a single 7920A disk, the job takes four minutes of elapsed time.

For example, HP ran a job simulating a small business system with most of the work done in batch mode, principally in RPG but with some Cobol.

"Concurrently with the production batch work, two terminals performed new applications development with the editor," HP said.

The results of the tests showed increased memory size significantly increased throughput. "Therefore, batch throughput requirements should be used to de-

(Continued on Page 44)

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Index Systems Has Turnkey for Thrifts

CAMBRIDGE, Mass. — Index Systems, Inc. has a turnkey minicomputer system it said enables thrift institutions to obtain instant profiles of customer activity.

The system identifies prospects for cross-selling and automates direct mail campaigns, the firm stated.

Called Mini-Mark, the system was designed for use in conjunction with either in-house or service bureau facilities, Index Systems said. It is based on a Digital Equipment Corp. PDP-11/34.

The system can display all account relationships in a household for use in customer service at branch locations and for credit checks. It also filters lists of customers by various parameters, analyzes market penetration and flags unusual account activity.

The Mini-Mark data bases include account data, updated nightly from a tape supplied by the in-house system or a service bureau with household data maintained on-line, the firm said.

A typical system includes the PDP-11/34, 128K of memory, disk, two magnetic tapes, a 300 line/min printer and a communications multiplexer.

The hardware is in the $120,000 range and the software costs $60,000. Index Systems is at One Broadway, Cambridge, Mass. 02142.

ADC Has PDP-8/E Prom/RAM Card

SANTA ANA, Calif. — Applied Data Communications (ADC) has a series of programmable read-only memory (Prom) and random-access memory (RAM) cards compatible with the Digital Equipment Corp. PDP-8/E.

The cards provide up to 2K of Prom and 2K of RAM on a single quad board, ADC said. Each quad card has provision for a total of 4K 12-bit words of memory with jumper-select addressing at any field in the memory, the company claimed.

The RAM starts at the first word in the field and has 256-word modules up to 2K. The Prom is in 1K-word increments.

A Prom/RAM quad board with 2K Prom costs $575 from the firm at 1509 E. McFadden Ave., Santa Ana, Calif. 92705.

HP Tests Ability Of Series II CPU

(Continued from Page 43)

termine memory size in this type of environment," HP concluded.

HP also tested a dedicated transaction-processing system using the Image/3000 data base management techniques. Half of the terminals used executed a Cobol program "which in response to prompts accepted five values on the terminal corresponding to the master data sets" — order number, customer number, part number, part description and quantity.

"These values were formatted into a single-detail entry and written to the data base. The data base was locked before the write and unlocked afterwards. Think time was 1 sec for each input value. Response time was measured from the first input to the next prompt," HP said.

The rest of the terminals executed a Cobol program which accepted a key value from the terminal and retrieved the detail entry with that key. Think time was 23 sec, the company stated.

The results showed response time was acceptable up to a point and then began to deteriorate. A knee developed in the graph at 48 terminals and 2 sec response time. Thereafter response time increased.

The "knee" corresponded, the firm explained, "to the point where the data base itself was going as fast as possible forcing access requests to queue."

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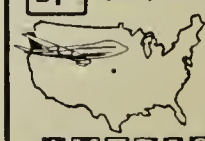

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CI Notes

Burroughs Taps Mirabito As Future Chief Executive

DETROIT — Burroughs Corp. Chairman Ray MacDonald has indicated President Paul S. Mirabito will become the corporation's chief executive officer (CEO) next December when MacDonald turns 65 and retires from his post as CEO.

MacDonald will have been with Burroughs for nearly 43 years. Mirabito has been president since November 1973.

Although it was not disclosed whether Mirabito would acquire the additional duties as chairman, MacDonald said the "chief executive officer by any other name is still the chief executive officer."

Burroughs Wins Reversal Of Antitrust Judgment

DETROIT — Burroughs Corp. has won a reversal of a federal court antitrust judgment in favor of Palmer Data Corp.

The original judgment required Burroughs to pay $3.5 million in damages to the trustee in bankruptcy of Palmer, a San Francisco computer services firm formerly known as Computerminal.

Palmer had charged Burroughs with causing its bankruptcy by exiting the batch processing business in 1970 and selling existing incomplete contracts to companies other than Palmer.

Palmer contended that Burroughs had, in effect, forced its customers to do business with another processor chosen by Burroughs.

Recently, however, a judge overturned the February 1976 ruling stating that "not only did Burroughs not violate federal antitrust law, but also...nothing actually done by Burroughs was a cause of even nominal loss sustained by Computerminal."

Palmer plans to appeal the decision.

Supershorts

Pertec Computer Corp. has appointed Esselte Systems AB as its Scandinavian distributor for the XL line of distributed processing systems.

— — —

Microdata Corp. has announced an expanded agreement combining system sales efforts between its national sales force and the Authorized Microdata Dealer Organization, adding the Express series systems to the dealers' present Reality systems product line.

In Mid-'70s Peripherals Mart

Memorex Caused 'Price Erosion': Navas

By Catherine Arnst
Of the CW Staff

NEW YORK — Memorex Corp. quoted "unnecessarily low prices" in the extremely competitive peripherals market of the mid-1970s that resulted in "industrywide price erosion," according to John Navas, Memorex product development manager from 1972-1974.

Although the company was in severe financial straits and several months behind on its delivery schedules, it cut prices on its 3660 and 3670 disk subsystems below acceptable profit levels, Navas wrote in documents entered as evidence at the U.S. vs. IBM antitrust trial here, where he recently testified as a government witness.

The Sales Division had developed a strategy of pricing according to market demands, which resulted in "pricing below reasonable financial objectives," Navas said. This strategy was partially the result of analyzing the competition on the basis of "the lowest special bid a competitor ever made," he wrote.

Memorex also gave its salespeople a commission floor that benefited employees but was disastrous for the company, Navas said. "The commission is variable only if a salesman achieves a price higher than the [commission floor], whereas if he achieves a price lower than the [floor], he receives a guaranteed commission," he explained.

IBM Trial Documents

"The commission plan currently provides for no negative incentive in a downward renegotiation of the price," he added. "This results in a situation where the salesman comes to headquarters and alleges that he needs a 20% rental reduction to 'save the business.'

"In general, we wind up taking his word for it, save him from a discontinuance by allowing a price concession and he suffers no negative impact."

Memorex's pricing practices did have a negative impact on its disk product lines, however, which had been suffering from engineering difficulties since 1972, the documents indicated.

Unmet Promises

The combination of delayed delivery schedules and promises by field service personnel of additional features that were not yet announced in order to placate customers resulted in Memorex losing the Bethlehem Steel account, one of its largest, the documents showed.

After learning that the Bethlehem Steel account was in jeopardy, Navas discovered salesmen were "committing products to this customer which are not released to marketing and are not announced, and frankly may never exist in the form proposed/discussed by Sales because of a lack of understanding of a large amount of supportive material."

The breakdown in communications between the various manufacturing and marketing organizations within Memorex was exemplified in August 1972, when Memorex was slipping delivery schedules on its 3660 disk file but delivery was being quoted "as available," Navas said in one memo.

"No more new builds will be available...known discontinuances and [reconditioned models] are inadequate to cover current demand...the situation appears to be worsening...we are in serious danger of breaking commitments, losing sales momentum and precipitating further sales force defections," he wrote.

3670 Shipping Problems

Memorex's problems with its 3660 foreshadowed a similar situation that developed with the 3670, which began shipping in October 1972. By December of that year, manufacturing was "seriously behind the original commitment for the 3670," Navas said.

An authorized build schedule was proposed for 1973 which "would, in effect, let manufacturing off the hook" by decreasing the number of systems scheduled to be built, he indicated.

"As a direct result of reduced build schedules, our impact on the 1973 revenues plan as a minimum is $85,000," a January 1973 Memorex document said. Daniel O'Brien, Navas' superior, estimated the

(Continued on Page 46)

Survey Uncovers Disagreement On Future of Pricing for T/S

By Molly Upton
Of the CW Staff

There's not much agreement among time-sharing vendors over pricing trends in the industry, a *Computerworld* survey has found.

While one vendor expects prices to increase, another cited price competition and yet another sees stable pricing conditions.

There's also some disagreement over whether time-sharing firms are moving to take some of the black art out of calculating the costs of their services and to make them easier to understand by the consumer.

One indicated his firm is using transaction pricing on at least some applications. Transaction pricing involves charging a set fee for an identifiable task, such as an item update.

Currently most services charge on the basis of an algorithm calculating the resources used, and these have various names and include different proportions of CPU and I/O resources.

John Lewis, president of Real Decisions Corp., a Stamford, Conn., consulting firm, said the only trend toward standardization of pricing among vendors is that several are aggressively studying a move to transaction pricing.

But Russ Gloersen, manager of product support services at National CSS (NCSS), said he thinks several firms are moving in the direction of more simplified rates that are easier for consumers to understand and compare.

NCSS is planning to extend its Application Resource Unit (ARU) which charges one price to various portions of systems whose prices were previously different. This scheme is in effect on its Nomad data base package.

This would not be a price break, but rather an equivalent to what users are now paying, Gloersen explained.

Originally it was reasonable to charge on the basis of CPU utilization since much of the work on time-sharing systems was program development and programmers are concerned with CPU utilization, he said, adding more emphasis is now on applications and CPU use is no longer the principal criterion.

(Continued on Page 48)

MAI Plans Entrance Into Word Processing This Year

NEW YORK — Management Assistance, Inc. (MAI) plans to enter the automated office systems market this year with a word-processing system of multistation design and shared logic capability.

"I mention our decision today," Raymond P. Kurshan, chairman and president, told shareholders at the company's annual meeting here recently, "because it underscores our strengths, our commitment to planning and controlled growth and our desire to grow primarily from within."

The system will take advantage of the manufacturing, marketing and service capabilities of MAI's major subsidiaries: the Genesis One corporations, Basic/Four Corp., Sorbus, Inc. and MAI International Corp.

"Word processing is a new and rapidly growing field," Kurshan said. "The consensus of all current surveys and expert opinions is that word-processing systems will be the hub of the office of the future — linking machines that type and edit with other machines that copy, duplicate, store and retrieve text material and transmit it from office to office."

A detailed announcement of the MAI word-processing system will be issued later this year, he added.

Basic/Four Introductions

"At last year's meeting," he noted, "I said we expected MAI's profitability to continue and to increase steadily during the year. The results for 1976 have proven the accuracy of that forecast. We have the same expectation for 1977."

In discussing the company's plans for the remainder of 1977, Kurshan announced that its Basic/Four subsidiary will begin manufacturing a high-speed printer during the last quarter of 1977 and will begin offering two software packages — for use by hospitals and insurance agencies — in March.

He also announced that ground had been broken for this subsidiary's new manufacturing, reasearch and office facilities.

Noting that "MAI is also a company on the move with respect to marketing Basic/Four systems," Kurshan announced sales offices in the U.S. will be increased from 19 to 23 while its network of dealers will be expanded from 25 to 35.

"Our total sales force outside the 50 states, which now numbers 106, will increase this year by about 30%," he said. "Germany is an example of this continuing expansion. We expect to double our sales force in Germany by the end of fiscal 1977.

"At the same time, we will increase the number of our overseas distributors," he said, citing last year's appointment of distributors in Australia and Italy.

MAI also announced the appointment of a distributor in Japan — Lindeteves-Jacoberg NV — marking the firm's first entry into "the country recognized as having the greatest international market potential for [MAI] products."

The agreement brings the total of MAI's overseas distributors to 17 covering 22 countries.

New Marketplace

As for the company's third area of operations — maintenance of DP equipment made and sold primarily by other companies — Kurshan forecast the emergence of a new facilities maintenance marketplace. He described it as "a single maintenance source for all the computer equipment a company uses, regardless of whether it is supplied by one or 10 manufacturers."

MAI's domestic maintenance subsidiary, Sorbus, expects to begin programs offering users maintenance service on teleprinter terminals manufactured by Digital Equipment Corp. and for IBM 3 computers, Kurshan also announced.

Referring to the fact that MAI has doubled in size over the last three years, he said, "We have made an orderly transition from a company dependent on rentals from obsolete equipment to one with revenues from various sources.

"And we have made an orderly transition from a marketing and service company into a technology, manufacturing, marketing and service company — while at the same time expanding a domestic and international marketing and maintenance organization.

"I stress the word 'orderly' because it is the key to any characterization of MAI's management philosophy. Our prime objective is controlled and profitable growth. We do not seek growth for the sake of expansion alone.

"We are familiar with the problems inherent in overdeveloping one segment of our operation without the required ability to support it. We want to retain our balance — to reach out, but not fall over," he concluded.

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* The Forums are held in conjunction with COMPUTER EXPO and require separate registration and fees. They are held each day from 9 AM to 1 PM. One day's admission fee is only $45; additional days are $35. Advance registration is recommended. Call (800) 225-3080 to reserve your space and get complete registration materials.

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Memorex Caused Price Erosion: Navas

(Continued from Page 45)

firm could lose $500,000 to $750,000 in revenues from the reduced build schedule.

By April 1973, the 3670 spindle was suffering from high error rates which "were the result of either poor engineering design of the spindle and/or quality control problems in manufacturing," Navas wrote.

Several accounts were concerned over the error rates, which were significantly in excess of IBM's, he warned.

'Leaked' Information

"Some individuals in field service have 'leaked' the information that a spindle reengineering effort is in progress which will solve these problems and that, as a result, these customers are asking for a commitment for when the reengineered spindles will be available. There is no question that the accounts appear to be out of control," Navas wrote.

He suggested the company exert "better control over information that is given to field service which results in the out-of-control situations identified above."

When Navas described two products being developed in September 1973 — the Explorer and the Scout, which would provide additional capabilities to the 3670 — he again recommended the details of these new products not be released to the sales organization.

"I feel the premature leaks could cause additional confusion and potential loss of business," Navas said.

Correction

Incoterm Corp. currently has a $5 million long-term line of credit, of which $2.2 million and not $5 million was in use at the end of the company's fiscal year on Feb. 28 [CW, March 21].

Auerbach Study Predicts

Japanese to Have Greater Impact on U.S. DP Mart

By Elinor Gebremedhin
Special to Computerworld

PENNSAUKEN, N.J. — Although non-U.S. manufacturers have had practically no impact on the domestic U.S. computer market, that situation may soon change.

The Japanese will provide a more serious challenge, according to a study by Auerbach Publishers, Inc.

The study attributed the distinctive strength of the Japanese to a cooperative interaction between government and business, as well as the more usual success factors of product excellence, financial resources and marketing skill.

The Japanese government "liberalized" competition in Japan last year, allowing non-Japanese manufacturers to compete domestically in all market sectors except government, whereas before there had been preferential treatment for Japanese vendors.

It also permitted foreign-based manufacturers to have wholly owned subsidiaries instead of requiring connection with the Japanese.

Simultaneously, the Japanese government encouraged its own companies to begin international efforts. A healthy base at home had been established — a base that is bound to help the Japanese as they move abroad, by providing the ongoing developmental capabilities so vital to computer users.

Boasts a Vigorous Market

Japan now boasts a vigorous market with no less than six domestic companies engaged in the development and marketing of medium and large general-purpose mainframes as well as the more usual proliferation at the low end of the market.

Of the six — Fujitsu, Hitachi, Nippon Electric (NEC), Toshiba, Mitsubishi and OKI — only OKI shows signs of dropping out of the mainframe market.

The remaining five are all sizable concerns with a solid financial base — due either to a very successful computer business, in the case of Fujitsu, or to a successful computer business as part of a large diversified operation, in the case of the other four.

About 72% of Fujitsu's income of $900 million in fiscal 1975 was the result of its position as the leading Japanese supplier in Japan's domestic market, second only to IBM. It is competing successfully against multibillion dollar firms like Hitachi ($6 billion), Toshiba ($5 billion) and Mitsubishi ($2 billion), whose individual data processing income yields less than 10% of overall income. NEC falls in a middle ground, with 25% of its $1.2 billion coming from DP-related sources.

Strong Product Lines

If the companies are strong, so too are the product lines. The Japanese government has sponsored joint developmental efforts that have resulted in three new product lines — the "M" series developed and marketed by Fujitsu and Hitachi; the Acos-77 series developed and marketed by NEC and Toshiba; and the Cosmo series developed by Mitsubishi and OKI, but marketed mostly by Mitsubishi.

All three lines are similar enough to IBM systems to allow IBM users to convert, yet all have distinctive features marking creative efforts on the part of the Japanese.

Software development has generally lagged behind hardware in Japan, but the Japanese government has started spending money to close the gap. Basic software on the new systems has drawn tentatively favorable comments.

The proof of the pudding is in the eating. The first year that the new systems were available in sufficient quantity to provide a test of market strength was fiscal 1975 (which in Japan ended in March 1976).

The major U.S. large mainframe manufacturers contending in Japan are IBM, Burroughs and Univac; the others have a very small share of the market and the impact of European mainframers is negligible.

When the figures were tallied, it was found that Japanese makers had jointly shipped 55.8% of the 35,305-system total for the year, while non-Japanese makers only shipped 44.2%. Dollar values were more evenly divided because of the greater strength of Americans in very large systems.

These figures compared with 48.4% of the fiscal 1974 total secured by Japanese makers — a leap of nearly 7%.

International News

Preliminary statistics for fiscal 1976 show the five Japanese leaders with rises in computer sales that range from 10% to 25%. Fujitsu alone has already raised its market share by 3%.

Figures like these can only mean that U.S. makers are losing ground. The Japanese government obviously felt comfortable about its domestic strength when it "liberalized" competition.

Of course, some of the success of Japanese makers could be attributed to national loyalty on the part of Japanese buyers. Certainly, U.S. buyers would tend to look at foreign products very, very carefully.

ICL Rivals IBM

However, another Auerbach study, comparing the major large mainframe markets in the world, indicated that most non-U.S. manufacturers have not succeeded in dominating home markets — IBM has, instead. The only country in the world boasting a single manufacturer with a market share greater than IBM's is Britain with International Computers Ltd. (ICL) and ICL's acquisition of Singer undoubtedly helped out.

At the accelerated growth rate provided by the new systems, it will only take Fujitsu two years to achieve this status, and there are four other Japanese manufacturers competing with strong product lines.

Users cannot indulge in nationalism if the product does not meet their needs, and obviously Japanese users feel that Japanese computers meet their own needs quite well.

Gebremedhin is an editor with Auerbach Publishers, Inc. in Pennsauken, N.J.

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T/S Vendors in Disagreement Over Pricing Trend in Industry

(Continued from Page 45)

While transaction pricing would facilitate comparison shopping, it tends to be applicable only to applications packages where the unit can be defined in end-user terms, Lewis said. Also, it is not easy for vendors to establish prices under this method, he added.

Although many firms are studying transaction pricing, no one wants to be first, Lewis said. The first firm offering transaction pricing will receive a lot of attention, but it will also be the target for underpricing by other firms, he believes.

Rapidata, Inc. has instituted transaction pricing on its cash management service and plans to implement it on other applications, especially those involving the firm's Rapidvoice Touch-Tone phone applications, according to Harvey Hendler, marketing manager for capabilities.

Transaction pricing makes marketing easier because the price is predictable by the consumer and overcomes a lot of uncertainties in doing business with time-sharing companies, he said.

Hendler conceded, however, that developing pricing for transaction processing is quite difficult technically.

Future of Pricing

Will prices go up or down?

Gloersen said he'd heard rumors of indiscriminate discounting where vendors use discounts without any present volume requirements in order to induce users to subscribe to their service.

NCSS, he observed, offers discounts to large customers whose costs exceed a specified amount.

Rather than seeing price cutting, Hendler anticipates price increases in the future by several vendors that he declined to name.

Remote computing services have stabilized and most companies are successful not on the basis of price, but on the merit of their services, which are hopefully unique, he said.

Rapidata, which specializes in services to financial institutions, recently dropped prices on storage of files accessible by its data base system. Rather than a reaction to what other firms were doing, Hendler said this was "just a realistic approach to the financial marketplace."

Among those raising prices was Manufacturing Data Systems, Inc. of Ann Arbor, Mich., which increased prices about 10%.

Tymshare, Inc. raised its connect rates on its Digital Equipment Corp. Decsystem-10s and IBM 370s on March 1 from about $10- to $12/hour on the prime shift and also raised connect charges on nonprime-time shifts from $5- to $6/hour.

This was an adjustment to bring the firm more into line with prevailing rates, although Tymshare's connect prices are still comparatively low, he said.

He doesn't foresee any radical price cutting in the industry. Prices are tending to increase, if anything, he said.

However, he observed, price frequently isn't the determining factor in choosing a network.

Although there may be some future applications for which transaction pricing might be desirable, Tymshare currently does not use this pricing method, he said.

Last summer Tymshare received an unexpectedly large response when it cut in half its rates for work processed during nonprime-time hours.

With the trend toward remote batch type of work rather than straight interactive jobs, many users took advantage of the price break, he said. The initial effect was to lower revenues for the next quarter, but by now the firm's earnings are continuing to improve, he added.

One reason why Tymshare decided to introduce lower prices for nonprime-time was that it sought to avoid adding more CPUs by leveling the workload.

Control Data Corp. raised prices on its data services an average of 8.5% between December and January. The firm cited inceasing costs of labor and materials as the reason.

Bill Bird, president of Itel Corp.'s Data Services Group, sees industry prices remaining fairly stable.

The industry is based around a semifixed-cost item and, as volume increases, profits should also rise, he said, so he sees no reason to increase prices.

Bird cited pressures from the decreasing costs of minis. "Companies like ours with on-line services are going to have to think twice about increasing prices so we don't force people off our systems to get their own.

However, Bird doesn't anticipate prices will drop.

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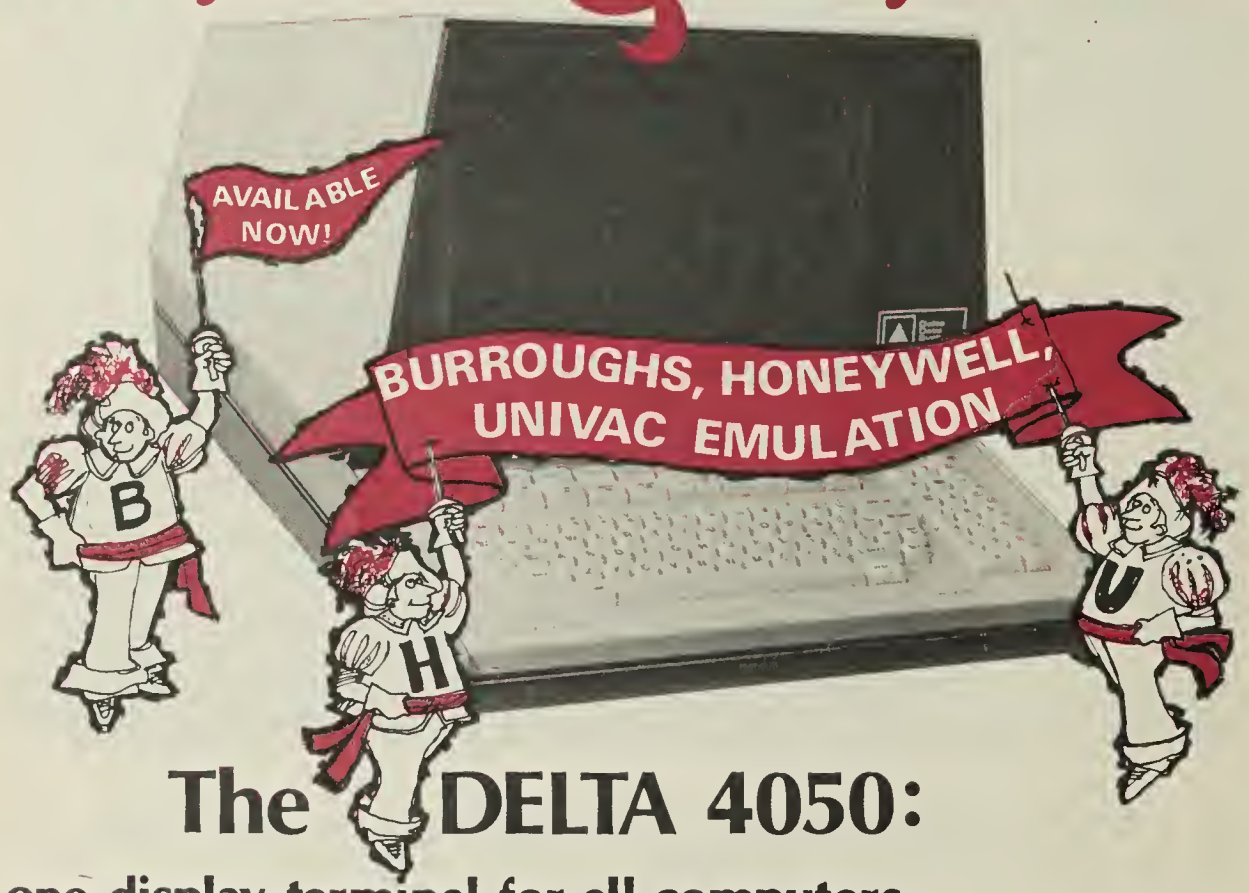

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NCR Earnings Rise 32% in '76 As Revenues Reach $2.3 Billion

DAYTON, Ohio — Although NCR Corp.'s Chairman William S. Anderson expects international markets to eventually "greatly exceed" the domestic market for NCR products, in 1976 domestic operating income exceeded that from international operations.

Domestic operations were primarily responsible for the company's improved earnings, which rose 32% to $95.6 million, the annual report observed.

Revenues rose from almost $2.17 billion in 1975 to $2.31 billion in 1976.

Anderson said NCR has set more aggressive revenue and profit objectives for 1977.

U.S. bookings during the year reached a new high. Orders for both computer systems and terminal and data entry systems exceeded the 1975 levels, the firm said.

Close Margin

The margin between domestic and international operating income was much closer in 1976 than in 1975. In 1976, domestic operating income edged ahead to $170.8 million compared with $170.4 million from the international sector.

In 1975, the international business contributed $153.9 million compared with $132.2 million from the domestic sector.

Although 1976 was a difficult year abroad, NCR's operating income outside the U.S. exceeded that of the prior year, Anderson observed.

Last year marked "the ending of a crucial four-year period in the company's history," he said.

"The challenge of that period was to restore profitability and to convert NCR into the kind of company which could meet the rigorous requirements of leadership in one of the world's fastest moving industries," he said.

NCR has reduced employment 35% from 103,000 in 1969 to 67,000 currently, but earnings have risen 91% during that period.

Bought and Sold

During the year NCR bought Data Pathing, Inc., thus acquiring a line of factory data collection equipment and an existing customer base in efforts to strengthen its position as a "computer systems supplier to industrial companies."

The firm also opted out of the military communications systems business with the sale of Electronic Communications, Inc. "Neither its products nor skills were transferable for meeting our future requirements as a computer systems supplier," Anderson explained.

NCR allocated $94.3 million for research and development during 1976 compared with $84.9 million in 1975.

Revenues from terminal and data entry systems in 1976 grew 39% to $637.2 million; there are over 300,000 NCR terminals, electronic cash registers and data entry products installed.

Under revamped equipment groupings initiated last year, the large growth shown by the old terminal and data entry systems group is no longer so evident.

In 1976, however, that specific group's revenues jumped to $637.2 million compared with $459.7 million in the previous year and also tapped computer systems' 1976 revenues of $495.2 million.

The old grouping of computer systems, terminals and data entry systems and free-standing business equipment became five groups.

The new groups and their 1976 revenues are computer systems, nearly $544 million; retail terminals and systems, $297.9 million; financial terminals and systems, $227.3 million; mechanical, $178.3 million; and general-purpose terminals and systems, $63.3 million.

NCR's domestic data centers completed a $12 million program during 1976 involving the installation of new equipment and implementation of new services, the firm said. A comparable program is under way abroad.

Centers began converting to the Starcom financial system that provides thrift institutions with improved interactive capabilities, according to the report.

Financial News

The Starcom retail system is under development. The Starcom exchange system, now operating in a controlled environment, provides electronic transfer of funds among retail stores and financial institutions.

On the financial side, long-term debt was reduced to $625.8 million from $664.1 million last year.

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A special report in the April 25th *Computerworld*.

Whether you're sorting, spooling, writing, reporting, managing, maintaining, securing, capturing, manipulating or preparing data — you've probably used (or thought about using) one of the multitude of utility packages currently available.

Computerworld's April 25th special report, edited by Don Leavitt, will take a close look at the selection and use of these packages — with tutorials, user experiences and commentary on topics like these:

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ISS Univac's '77 Net for OEM Sales Rises More Than 50% Over Past Year

CUPERTINO, Calif. — ISS Univac's 1977 revenues from sales to OEMs rose more than 50% compared with the preceding year and accounted for over half of the division's business, according to Division President Everett Bahre.

Further growth is expected in this market in the year starting this month, he added.

The firm is moving on several fronts, with two 317.5M-byte drives of different technologies in production and development and the acquisition of a fixed-head disk drive that should facilitate entry into new markets as well as into disks with both fixed and movable heads.

Jack Taylor, national sales manager, explained ISS' OEM market consists of two categories: lessors such as Itel Corp. and Telex Corp. who distribute the IBM-compatible products and minimakers such as Digital Equipment Corp. and Hewlett-Packard Co. ISS does not sell to the end user.

ISS recently shipped its 317.5M-byte drive, the Model 12, which is compatible with IBM's 3350 but is field upgradable from ISS Models 10 and 11, which are100M- and 200M-byte units.

The 12 essentially embodies 3330-type technology, Taylor added.

A user can link his original controller, with new changes, to a variety of 10, 11 and 12 drives, Taylor said.

The upgrade is accomplished primarily through changing the electronics, but the customer also receives a "data stack" for the 12. The data stack is a pack which ISS recommends should remain within the drive, he added.

First in Series

Later this year, the firm expects to ship the 7350, also a 317.5M-byte drive that is 3350-compatible, Taylor said.

But the 7350, expected to be the first in a series of higher capacity drives from the firm, exemplifies the trend toward Winchester-type technology, with thin coating on the fixed media and a head that is in contact during start/stop read and write operations, he explained.

ISS, which acquired media facilities when it bought part of Caelus Memories, has been working on thin coating for some years, Bahre said.

The firm's market is basically the 100M-byte through 300M-byte range and it does not produce disk products used in Univac's minicomputer, he said.

However, with the acquisition of a fixed-head disk from Micronetics [CW, March 28], Bahre is looking at the OEM market in the lower capacity range.

The new acquisition will take ISS into such markets as the point-of-sale and other minicomputer related areas.

Contracts

Daniel, Mann, Johnson & Mendenhall has been awarded a contract by the U.S. Army Corps of Engineers to design a computer-aided engineering and architecture design system.

Computer Management Services has received a remote facilities management contract from Electronic Mortgage Services, Inc.

Pertec Computer Corp. has received a two-year extension contract from Bell & Howell to manufacture computer output microfilm systems.

Computer Devices, Inc. has received a $1.7 million private-brand contract from Alanthus Data Communications Corp. for Miniterm terminals.

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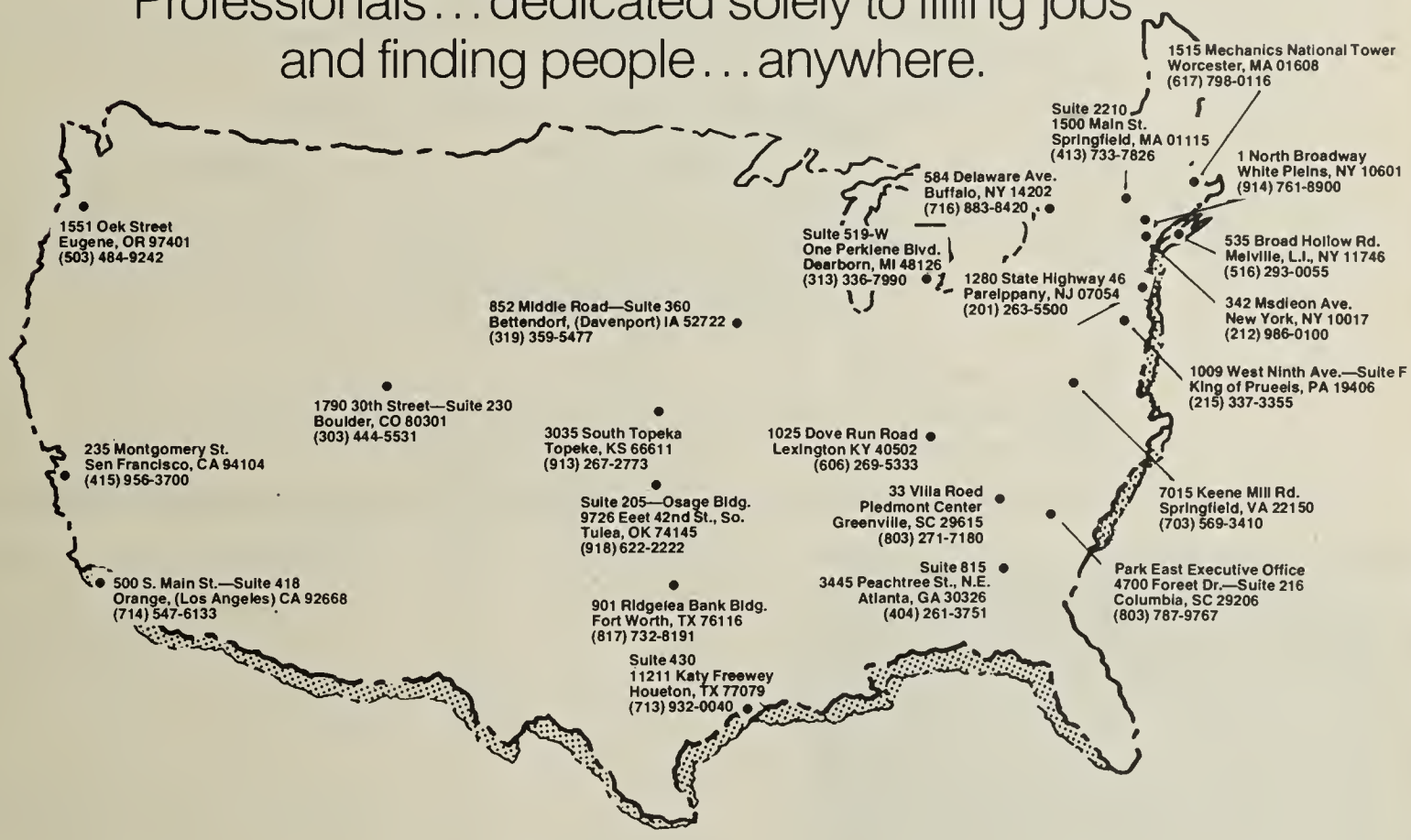

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Sound like a great opportunity? It is. So, if you're interested, look into positions which currently exist in the following Raytheon Service Company locations:

Boston, Chicago, Dallas, Detroit, Minneapolis, New York, St. Louis, San Francisco Bay Area, Washington, D.C.

If you think you qualify, send your resume and salary history to David Murray, Raytheon Service Company, 2 Wayside Road, P.O. Box 503, Burlington, MA 01803. Or call (617) 272-9300, Ext. 302.

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To handle the most complex installation, repair and maintenance tasks on a full range of major customer equipment. This senior position carries a diversity of responsibilities for major accounts and includes responsibility for training other personnel and for functioning as regional technical support specialist.

CUSTOMER ENGINEER

To install and service a variety of customer computer equipment. This includes preventive maintenance, troubleshooting, diagnostics and repair, and possibly account responsibility.

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To service a range of computer equipment: troubleshoot and diagnose common equipment problems and make repairs — under the direction of senior service personnel.

CUSTOMER ENGINEER TRAINEE

An entry level position in customer service — to learn, under direct supervision, the troubleshooting, repair, and maintenance of customer computer equipment.

These positions require experience with IBM 360/370 systems with compatible memories: IBM plug-compatible peripherals; Honeywell 200, 2000, and 3200 systems and related peripherals.

NATIONAL TECHNICAL SUPPORT SPECIALIST

To assist in the development of business plans and equipment take-over . . . to analyze machine failures . . . to coordinate support efforts . . . and to carry on on-going review of field service staff and support requirements. Eight to ten years experience required.

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To pursue computer services sales activities in assigned territories. Compensation includes an attractive base salary plus a progressive commission plan. Candidates should have related direct sales experience.

RAYTHEON

RAYTHEON SERVICE COMPANY

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Data Processing

Immediate Chicago Openings

Computer Professionals are needed at once to fill career openings created by expansion in Information Systems Applications and O.S. Software. Sargent & Lundy is a leading, nationally known consulting engineering firm serving the Power Industry. Our Data Processing Installation includes a UNIVAC 1106 computer system operating under EXEC 8 with plans for a larger system in the near future.

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Innovative individuals thoroughly experienced in computer based system design principles, data base concepts and sound COBOL programming practices, to formulate solutions of business problems through the use of information processing systems. Responsibilities include feasibility studies, general design, development and installation. A Bachelor's degree, minimum 3 to 4 years experience, and excellent verbal and written communicative skills are necessary.

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Degreed with 3 or more years of experience in the programming of complex software additions or modifications to the operating system, language processors, and utilities. Documentation requirements make strong communicative skills mandatory for this position. UNIVAC experience is helpful.

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Medium scale State Government Installation is upgrading capabilities into OS/VS, VM, distributed processing, and DB/DC.

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- OS/VS internals
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Other helpful experience includes:

- Software evaluation and procurement
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- CICS and/or VM/CMS experience

Please forward resumes in confidence to:

Mary C. Pope
Department of Public Welfare
Office of Management Services
Technical Standards & Services
Room 801, Mc Cormack Building
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Boston, Mass. 02108

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Employment Agency for Computer Professionals

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Two staff positions and one supervisory position exist in an expanding technical support group. We are currently converting from OS to SVS and CICS to CICS/VS using two 370/158 computers. Skills required include three to four years experience in OS/VS internals, SYSGENS, telecommunications and performance monitoring.

Excellent salary, top benefits and growth potential with this energy leader. Send complete resume, including salary history to the Personnel Department.

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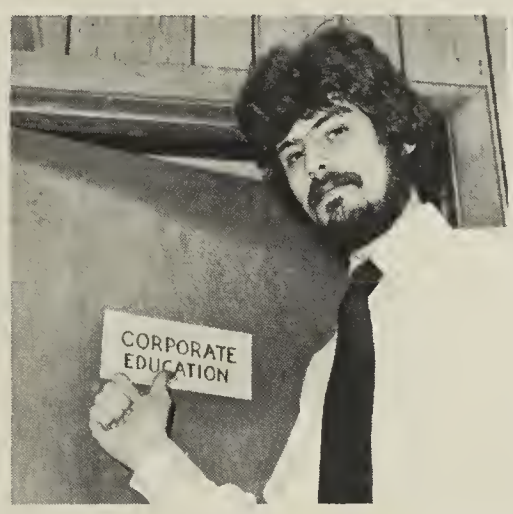

Because in order to find the best path for your career in any company, you need a clear idea of where the company's at.

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If you're good at what you do, we'd like to hear from you. Call Bob Vitale collect any business day from 9 AM — 5 PM at (617) 485-9174. Or, if you prefer, send your resume to him at Data General Corporation, Route 9, Southboro, MA 01772.
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Data General

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A challenging position exists within our organization for an aggressive professional seeking personal growth and development. You will work in our 370/158, OS/VSI Data Center.

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The position involves the teaching of introductory computer science, computer languages and systems to community college students. involvement in the college and community is aiso expected. Applicants should have a master's degree in either computer science or informational systems. Previous work experience would be helpful.

Send inquiries by May 1, 1977, to Charles E. Jackson, Chairman, Division of Applied Science and Mathematics, Jamestown Community College, Jamestown, N.Y. 14701.

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SUNY Arts and Sciences College seeks applicants for position of Director for Computer Center with staff of 11 and Burroughs 4700. Director reports to Vice President for Academic Affairs and is responsible for development and administration of all academic and administrative computing needs. Appropriate advanced degree or strong background in computer applications is essential. Supervisory experience in College or University computing operations is highly desirable.

Position available at competitive salary 6/1/77.

Applications and supporting documentation should be sent before 4/15/77 to:

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State University College at Fredonia
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communications software development

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You will work closely with hardware development and use the latest microprocessor components and peripherals. To qualify, you should have experience in one or more of these areas:

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Make a good living where the living is good. There's no question—living is good in the Dallas area. Our public school systems have earned national recognition for excellence. We're one of the fastest growing areas in the nation, yet our housing dollar still buys considerably more home in Dallas than it would in most other metropolitan areas. We're surrounded by lakes, and blessed by beautiful weather year 'round. We back professional, university, and high school athletic teams, and we support our symphony, theaters, the civic opera and several museums. But, best of all, most of us are down home friendly people.

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• As a computer science professional with three or more years of real time programming experience using ALC on large scale and 16-bit mini-computers, you will be involved in program development, design, and analysis for large scale multi-tasking systems in advanced technology electronics. Experience with the production of product software to support electronic systems in government procurements is highly desirable.
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Software Systems Acceptance Test Engineers

Positions are open for Test Engineers with 2 to 10 years experience in the formal acceptance testing of software systems. This experience should include the development of test concepts, test plans, formal test procedures and test software. Experience in conducting formal acceptance tests and the analysis of test results is highly desirable. Positions are open for personnel with IBM 370 software testing experience as well as 16 bit mini-computer software testing. Real time experience desirable but not necessary.

E-SYSTEMS
Garland Division
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US Citizenship Required

If you qualify, send your resume with salary history to:
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P.O. Box 6118/Dallas, Texas 75222

PROGRAMMERS/ PROGRAMMER ANALYSTS

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As the elite Honeywell software house we're going to continue our unprecedented growth this year. So we need Programmers and Programmer Analysts who can grow right along with us and be appreciated for their efforts.

Our computer installation consists of a Honeywell 6040 and G-400. Our clients include a variety of commercial companies as well as state and federal agencies. Assignments range from large application systems to operating systems modification and enhancements. We have several immediate openings for application people with at least 2 years of experience. Good knowledge of COBOL is a must, along with some data base experience. Honeywell 6000 experience preferred, but not vital.

If you're feeling underappreciated, why not call:

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If you prefer, you may forward a resume or detailed letter including salary history to Mr. Stauffer, Dept. BG-273, at the address below.

DRC
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Our client, a leading engineering and construction company located in Southern California is seeking a top-flight manager to lead its business systems and programming staff of over thirty professionals. The qualified candidate must have prior engineering or construction company background with proven management credentials.

This position offers good management growth opportunities in a dynamic and expanding environment. Our client is located in beautiful new surroundings and will pay complete relocation expenses. In addition, the company offers an excellent salary and fringe benefits package.

Send resume and salary history in confidence to Consultant:

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Additional openings exist for individuals with data base management experience.

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AiC

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Expanding teleprocessing group has an opening in the development and maintenance area. 1 or more years of TCAM experience is desirable. Strong assembler language background is necessary. Knowledge of SNA and SDLC is a definite plus.

We offer an advanced MVS R3.7 MP168 environment.

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Harris Computer Systems, a manufacturer of large medium-scale digital computers, has several positions available. Due to rapid growth, expansion positions are available at our divisional Ft. Lauderdale, Florida location in addition to key locations throughout the U.S.

PRODUCT MARKETING MANAGER

BSEE, physics or computer science. Must have computer design or systems analysis exposure coupled with hardware sales. Will do marketing evaluations and analysis, forecasting and monitor product development. Will also do competitive analysis.

SALES MANAGEMENT

5-10 years' with a proven track record in hardware sales plus supervisory experience. Prefer CDC, Univac, IBM or other main-frame exposure. Degree in marketing, math or computer science.

MANAGER FIELD ANALYST SUPPORT

Degree plus 5-10 years analyst and supervisory experience in sales, installation and customer support.

PROGRAM MANAGER

Will administer major accounts and interface with sales and customers. Degree plus 7-10 years' in computer manufacturing environemnt with supervisory responsibility.

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BSEE and mini-computer or main-frame experience-software related, salestrack record with vast knowledge in software market trends, applications and pricing.

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FIELD ANALYSTS

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(1) To develop and present hardware courses on computers and peripherals. Disk experience necessary plus degree. (2) Or develop and repair and present software courses.

Both positions require 3-5 years' programming experience and operating systems knowledge.

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Digital logic background with 2-4 years' experience in technical writing. Mil-spec documentation desired.

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6 months electrical school plus high school and solid-state familiarity. Florida Lauderdale positions. Prefer S & SE applicants.

Send your resume in complete confidence to W.D. Taylor, Harris Corporation, Computer Systems Division, 1200 Gateway Drive, Fort Lauderdale, Florida 33309.

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We need successful people with proven skills. A college degree (computer science majors preferred) or equivalent experience is required. We can offer competitive salaries, a professional environment, and an unusually liberal benefit package. If you qualify, please write to:

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- Three to five years programming experience.
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- Data base background required.
- Must be able to take active lead in the continued development of in-house DBMS.
- Project management experience.
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Coordinate efforts of a Senior Management Task Force in redefining the capabilities of a major system providing direct service to our customers. Direct a 10 member Project Team (of Analysts and Programmers) in the redesign and implementation of this system utilizing our IBM 360/75 computer with TOTAL. Position requires demonstrated success in the design and implementation of major systems projects, prior supervisory responsibility for other analysts' activities on a project, project planning/management skills, excellent written and oral communications skills. Familiarity with data base management programs, particularly TOTAL, is highly desirable.

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A range of assignments from Senior Systems Analyst to Programmer/Analyst. Each position will afford varying levels systems design and analysis responsibilities for Manufacturing and Administrative applications. Our environment emphasizes techniques for problem analysis and systems design, and project planning and control. This skills emphasize rather than specific applications experience allows us to maximize our utilization of staff capabilities and to provide broad project exposure for the individual. Positions require successful participation in a major systems development environment, excellent communications skills, skills in project planning and commitment to achievement.

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Responsibilities include the coordination of academic computer usage, writing user manuals, developing short courses and faculty workshops, and supervising the instructional programming and stuoent consulting staff.

Bachelor's degree required with a major in computer related field or appropriate experience. Three years in scientific programming and analysis of which at least one year must have included the supervision of subordinate employees.

Required thorough knowledge of BASIC FORTRAN, one assembler language, one text editing language, one business oriented procedural language and one interactive timesharing system. Must demonstrate an understanding of the computing requirements of an academic environment. Prefer familiarity with the preparation of formal proposals and feasibility studies and with governmental regulations and review procedures.

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- Knowledge of advanced operating systems
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Newton, Mass. 02160

ANALYSTS/PROGRAMMERS

Opportunities exist in Indianapolis, Columbus and Chicago for seasoned analysts/programmers to further their career. Position provides for exposure to multi-hardware and multi-software environments for the purposes of evaluating and testing computer systems. Formal training programs, excellent fringe benefits and opportunity to expand your background.

Candidates should possess:

* strong oral and written communication skills
* minimum 5 yrs. industry experience
* programming competency in COBOL and one other language
* degree preferred

For immediate consideration, send resume stating salary history and location desired. Replies will be handled in confidence.

CW Box 4978, 797 Washington St., Newton, Mass. 02160

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Data Processing

SYSTEMS ANALYST PROGRAMMER/ANALYST

Robbins & Myers, Inc., a leading manufacturer of electric motors, industrial pumps, overhead material handling systems, electric heat and fans, currently has two openings in the corporate informations systems department. We offer challenging opportunity with a company that is moving toward development of a data communication network for multi-division/multi-plant locations.

The individual selected for our systems analyst position will be degreed and have two to four years experience in a manufacturing environment.

The ideal candidate for our Programmer/Analyst position will have two to four years programming experience with business application. He/She will be degreed and professional in ANSI COBOL and IBM hardware.

Our company offers an outstanding compensation package that includes competitive salaries and a comprehensive benefit program.

We're building an organization of people, who seek recognition and compensation based on their contribution. If you're this kind of individual, send your resume and salary history in confidence to:

Richard E. Anderson, Mgr.
Personnel, Salaried Employees
ROBBINS & MYERS, INC.
1345 Lagonda Avenue
Springfield, Ohio 45401
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R&M

SR. SOFTWARE ENGINEERS

They will provide direction in the planning section of our Retail Systems Software organization being responsible for interpreting systems specification and developing software operating systems, software language requirements and software diagnostics.

Should be familiar with the use of high level languages or system performance in a Real-Time processing environment. A degree and from 4-7 years applicable experience will round out your qualifications.

PROGRAMMER ANALYST

For

Retail Point-of-Sale Terminal Systems

Interfacing and integration of a retail Point-of-Sale terminal system to a multi-tasking operating system. Must be familiar with multi-tasking O.S. and have the ability to debug O.S. software. An engineering or computer science degree required plus a familiarity with assembly language programming and with reading and understanding the COBOL compiler generated assembly maps and core maps.

NCR's Retail Point-of-Sale Terminal Systems facility is located in rural east central Ohio.

The P.O.S. market is an exploding market and these positions offer substantial growth opportunities.

We invite your consideration at your earliest convenience.

Robert W. Donovan
Terminal Systems Division - Cambridge
NCR Corporation
Box 728
Cambridge, Ohio 43725
(614) 439-0291

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Software Engineers

Programming Language Expert

Immediate opening for an innovative professional who can adapt or create standard and specialized languages for graphics terminals. If you have played a significant role in the development of a language processor and are familiar with current compiler technology and wish to be a key part of a new and fast growing department, then contact us with your qualifications.

Software Design Integrator

Applicant will be responsible for software integration. Position requires coordination and performance of module inspections; development and application of software testing methodologies and program complexity measures; will work closely with hardware/software designers; develop and maintain programming standards; develop system and subsystem tests; and integrate modules into state-of-the-art graphics systems.

Tektronix, Inc., develops, manufactures and markets internationally recognized precision electronic measurement instruments, computer peripherals and related electronic instrumentation.

Salary is open. Benefits include educational support, insurance and profit sharing programs.

Send detailed resume to: Mary Walhood, TEKTRONIX, INC., P.O. Box 500, C56, Beaverton, OR 97077

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Dallas, Texas 75207

DETROIT
Electronic Systems Personnel
1705 Fisher Building
Detroit, Michigan 48202

FLORIDA
Data Sciences Personnel, Inc.
Suite 205, 15490 N.W. 7th Ave.
Miami, Florida 33169

HARTFORD
Compass, Inc.
900 Asylum Avenue
Hartford, Connecticut 06105

LOS ANGELES
Constellation Enterprises
Suite 900, 3250 Wilshire Blvd.
Los Angeles, California 90010

MINNEAPOLIS/ST. PAUL
Electronic Systems Personnel
001 Nicollet Mall, Suite 1716
Minneapolis, Minnesota 55402

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New York, New York 10017

NORTH CAROLINA
TaskForce, Inc.
1046 E. Wendover Ave.
P.O. Box 6888
Greensboro, N. Carolina 27405

PHILADELPHIA
Systems Personnel
207 Fox Lane
Wallingford, Pa. 19086

PITTSBURGH
Electronic Systems Personnel
106 Lawyers Building
420 Forbes Avenue
Pittsburgh, Pennsylvania 15219

SAN FRANCISCO
The Computer Resources Group Agency, Inc.
303 Sacramento Street
San Francisco, California 94111

SYRACUSE
CFA Associates Personnel, Inc. (Agency)
2530 James Street
Syracuse, New York 13206

TULSA
Data Processing Careers, Inc.
Suite 10, Park 21 Building
2626 East 21st Street
Tulsa, Oklahoma 74114

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ESP Systems Corporation
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1211 Connecticut Avenue N.W.
Washington, D.C. 20036

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Tired of the cold and taxes of the North? Immediate needs exist for experienced data processing professionals with knowledge of large scale IBM 370 and Honeywell 6000 equipment Cobol. Main application emphasis should be in banking or financial areas. Further, programming positions are available in OS software technology and in the mini and/or micro processor software design & application areas. Salaries are open depending on experience. All fees, interviews and relocation expenses paid.

DSA applies singular emphasis on the recruitment and placement of data processing, engineering and high technology candidates. We are the only firm of this type in South Florida, so if you've considered leaving the North for an outstanding Southern lifestyle, send your resumes in confidence or call:

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Miami, Florida 33156
(305) 666-5881

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For information about these and other positions, call or send resume to:

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DATA SCIENCES PERSONNEL, INC.
15490 N.W. 7th Avenue
MIAMI, FLA. 33169
(305) 685-7891

SYSTEMS ANALYST/ DATA BASE MANAGER

Salary: from $1465/mo
Apply: Rancho Santiago Comm. Coll. Dist.
17th St at Bristol
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(714) 885-3000, Ext. 365

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If you are interested in a ground-floor career opportunity, then we should talk. Basic Timesharing Inc. is an established fast-growing manufacturer of business computer systems, based in California. We're looking for an experienced analyst to provide in-depth technical support to our system salesmen in our eastern sales region. Your principal responsibility, as part of the sales team, will be to analyze customer applications and propose system solutions. You will be based in Cherry Hill, New Jersey, and your position will involve some travel within the eastern states.

Naturally, you must have the ability to communicate effectively with customers. You must have insight, because each new customer has different needs. Your experience must include at least three years with minicomputer operating systems and business applications programming, preferably in interactive BASIC. If you're the right person for the job, we'll pay you an attractive base salary, plus strong profit-sharing, along with liberal company-paid benefits. Call or write Sam Anson, Eastern Regional Sales Manager.

Basic Timesharing Inc.
3 Executive Campus
Cherry Hill, N.J. 08002
(609) 662-1122

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data processing

A Very Good Year for Us. A Better One for You?

Amdahl's 1976 could mean a better 1977 for you.

It was our first full year of manufacturing and marketing the well-received 470V/6 computer system, and we had a very good year.

In fact, many in the business community nationwide are saying that Amdahl set an all-time record for a company's first full year of sales; we recorded over $92,000,000 in revenues.

A relatively small—but dedicated—Amdahl staff made it happen. We began 1976 with only 373 employees, and ended the year with just 770 (the more typical manufacturer of large computers like ours has thousands of employees). Our staff is growing daily, but at a rate consistent with our ability to attract the same kind of competent, enthusiastic individuals who enjoyed the challenge and excitement of 1976.

We could have a better 1977 with your help. You could have a better 1977, too. Toward that end, we would like to talk to you about our compensation and benefits package; you should be able to improve your 1977. Of at least equal importance, you are likely to find your days being filled with more pleasantness: we are exerting our best efforts to perpetuate the friendliness, regard for human feelings and the sense of involvement that have characterized the company since we began developing the 470V/6 in 1970. We need your best efforts to make both of our 1977s a better year. Please direct your response to Employment Manager, Amdahl Corporation, 1250 East Arques Avenue, Sunnyvale, CA 94086. We are, of course, an equal opportunity employer.

DESIGN AUTOMATION MANAGER

You will structure a group in support of new product development. You have in-depth knowledge of design automation system structure and previous management experience. Your experience includes one or more of these areas: design entry, documentation and data base control software, simulation/modeling, or physical design packaging and automatic test generation. Please indicate 427-E on your response.

SOFTWARE RELIABILITY ENGINEER

You will participate in engineering software reliability and quality assurance of hardware diagnostics and control systems programs for Amdahl's 470V/6 computer system and new products. You have knowledge and experience with most of the following: computer organization, logic design, minicomputer operating systems, software reliability, higher level and assembly languages (PL/1, 370 Assembler, NOVA Assembler preferred). Your ability to work with large scale computer systems is essential. You have an MSEE or Computer Science degree and a minimum of 3 years' experience or equivalent. Please indicate 425-E on your response.

amdahl

IMS PROFESSIONALS

Our client is a leading manufacturer in the Southern California area and one of the largest IBM users in the world. Because of many new development projects there is an immediate need for experienced IMS professionals at all levels. Key individuals are needed who can converse with users to develop requirements and design new on-line systems in a state-of-the-art environment. Due to major expansion projections in data processing there is ample opportunity for growth.

The company offers one of the best compensation packages in the industry and will pay complete relocation expenses to the West Coast.

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Newton, Mass. 02160

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Field Engineers

2-5 years experience in maintaining minicomputer, medium and large-scale systems and associated peripherals. Technical trade school background or equivalent military experience and ability to diagnose and correct basic CPU/Channel and subsystem failures. Must have broad background with computer systems manufacturer.

Field Engineering openings at various levels exist in these locations:

Dallas, Texas — New York, NY — St. Louis, MO — Milwaukee, Wis.
El Segundo, CA — Boston, Mass — Dayton, Ohio — Washington, D.C.
New Orleans, LA — Philadelphia, PA — Chicago, Ill. — Atlanta, GA
Seattle, WA

Positions also available in other cities.

Technical Specialists

(Cupertino)

Requires proven ability on wide range of computer systems equipment including CPU's and working knowledge of applicable program operating systems. Will act as interface between Field Engineering and other departments to analyze performance of systems and make cost results improvement recommendations. Requires 5-7 years experience troubleshooting and repairing a wide range of computer systems at district/regional responsibility level.

If you're looking for achievement with a dynamic, people-oriented company, send your resume & salary history, in confidence, to C. Horn, Professional Employment (Dept. FET), FOUR-PHASE SYSTEMS, 19333 Vallco Parkway, Cupertino, CA 95014. Equal employment opportunity is our pledge & practice.

Four-Phase Systems
Advanced Technology for Distributed Processing

Computer Professionals

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Bachelor's Degree in ADP related field required with 3 years experience in systems design and programming utilizing FORTRAN, ALGOL, COBOL and or PL/1. Experience with Data Base and on-line systems desirable.

SENIOR SYSTEMS ANALYST

Bachelor's Degree in ADP related field required with extensive knowledge/experience with digital image processing algorithms and systems.

SYSTEMS ENGINEER

Degree in engineering or computer science field required with 3 years experience in development of digital image enhancement equipment and techniques. Knowledge of mini/micro computer systems, I/O controllers, array processing and large disc management.

These positions offer excellent benefits, relocation assistance, and the challenge of becoming a team leader in the design and development of complex systems. For prompt and confidential consideration, send resume and salary history to:

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P.O. Box 1242
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NEWPORT, RHODE ISLAND

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SYSTEMS ANALYSTS

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Systems Consultants is a nationally known systems engineering firm headquartered in Washington, D.C.

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Aid in developing a profit center in which you will share the rewards! Ability to use A-L in modifying and implementing current programming and systems products which are now in use at this 360/370 environment.

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Client companies assume all fees.

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SENIOR SYSTEMS ANALYST

$21,000. Immediate need. Know inplant Systems and Mini-computers. Quality control and Lab Automation. Ability to carry project from survey thru implementation. Need good written and oral communications skills. Sys7 & PDP 11 a plus. Fee, relocation and interview expenses paid by client company. Call or send resume to:

Data Processing Dept.
PERSONNEL PLACEMENT
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(919) 584-5591

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Oustanding opportunity for self motivated, professional with heavy cobol background and on-line processing experience. Must excel in both verbal and written communications. Travel required twenty-five per cent of time. Prefer experience in Data Base, Structured Programming and knowledge of corporate purchasing and accounting functions.

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INFORMATION SYSTEMS
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AMERICAN COMPUTER APPRAISAL SERVICE
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(617) 261-1100

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* Agency or Accounting systems
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(NON TECHNICAL)

Market growth and customer response to our specialized data processing filing and handling systems has opened opportunities nationwide for additional sales personnel.

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Programmer Analyst

El Centro, California

BS in computer scinece, mathematics, physics or comparable disciplines. Minimum 5 years experience in FORTRAN assembly language with application on systems design and implementation. Previous work experience with CDC 3300 is desirable. Send resume and salary requirements to: Mr. Cecil Kirkis, P.O. Box 766, Seeley, CA 92273

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The ideal candidate will have 1 to 2 years experience maintaining DL/1 software, plus demonstrated skills in BAL, DOS/VS and VSAM. Additional qualifications would include COBOL, PL/1 and CICS/VS.

Enjoy working in the professional environment of Harley-Davidson where your skills and abilities will be utilized to their fullest. Our growth and continued expansion will open numerous avenues to further your career with the industry leader.

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DATA PROCESSING OPENINGS

Position Openings and Qualifications Requirements

OPERATIONS ANALYSTS/SPECIALISTS

(Software Support)

Minimum 2 years experience. Assists in the installation and maintenance of S/370 operating system software and software packages. Must have a general working knowledge of the following as related to the support of computer operations. (This is NOT an operating system software programmer position).

- HASP or JES2
- OS JCL
- Assembler Language
- General knowledge of OS or MVS System internals to include assisting in performance of Sysgens, applying of PTF's and APR's.
- Background in performing studies and projects.
- Knowledge of debugging tools, i.e., Logrec, General Trace Facility

Excellent opportunity for individuals with 2-3 years operating experience in a medium to large scale 360/370 O.S. environment. Knowledge of HASP, JCL, and CICS would be helpful.

We can offer job security with salary commensurate with skills, ability and experience. Interview and relocation expenses are paid.

Please submit resume and salary history in confidence to:

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Pennsylvania Blue Shield
CAMP HILL, PENNSYLVANIA 17011
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We offer an excellent opportunity for an individual with minimum of three years experience as a communications system analyst to join our rapidly expanding midwest time-sharing company.

Position includes assembly language programming for PDP-11 and/or Honeywell Level 6 computers, and debugging and maintaining communication software modules in our nationwide network. Will also assist in set-up operations for our new Columbus computer center, housing PDP-10's.

Bachelors degree or equivalent, and familiarity with one or more synchronous protocols required. Salary commensurate with experience.

Good benefit program. Office locations in 22 major cities. Please send resume to Personnel Manager:

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PDP11 COBOL RTS-E
Timesharing-For Nigeria

IMS SYSTEMS ANALYST
Internal & External Experience Required

OS/MVS SYSTEMS PROGRAMMERS

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with BTAM, TCAM, background

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We are in the midst of expanding our D.P. staff and are seeking experienced Basic+ programmers. We need self-reliant individuals with 1-4 years programming experience using the RSTS/E operating system preferably in a commercial environment. Please send your resume including salary history and requirements in confidence to:

MELVIN SIMON & ASSOCIATES, INC.

Data Processing Dept.
1712 N. Meridian St.
Indianapolis, Indiana 46202
An Equal Opportunity Employer M/F

DATA PROCESSING MANAGER

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Graduation from an institute of higher learning and 7 years' experience are required.

Beginning salary up to $17,800 annually depending upon experience. Apply to: City of Sheboygan — City Hall, Personnel Office, 828 Center Avenue, Sheboygan, WI 53081.
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If you are interested in relocating to the beautiful Pacific Northwest, we currently have an excellent position for an EDP professional with GECOS internals experience.

Data Base Admin . . . to 30K

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Des Moines, Iowa 50309
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El Segundo, Calif. 90245
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Park Ridge, Ill. 60068
(312) 298-1148

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Memphis, Tenn. 38117
(901) 767-5150

National Personnel Associates

field engineering

A Very Good Year for Us. A Better One for You?

Most computer professionals are aware that today's most advanced large-system technology was developed by a company that, not too long ago, was virtually unknown.

Now the phenomenon is widely known. Amdahl's 470V/6 performs as promised (it's the price-performance leader, with over 30 systems worth more than $125,000,000 in place by the end of 1976). And the company performs as promised: our hardware and software support exceeds the established standards.

Not well known, however, is that this major supplier of large systems is still, in terms of staff size, relatively small. At Amdahl, you're not lost in a sea of people: we began 1976 with less than 400 people and ended it with less than 800. There's still room on the ground floor.

We're looking for above-average talent. You can expect an above-average compensation and benefits package. Please direct your response to Employment Manager, Amdahl Corporation, 1250 East Arques Avenue, Sunnyvale, CA 94086. We are, of course, an equal opportunity employer.

Immediate openings throughout the U.S. and Canada. Field candidates will undergo a training period in California on full salary with housing, transportation, and other expenses provided.

FIELD ENGINEERING SPECIALISTS

You will have a minimum of 5 years' experience in maintaining large-scale systems with in-depth training on compatible CPUs. You will have company support in assisting the Amdahl customer in his mixed-vendor environment to maintain full operations in his center. Openings in several major cities and at Amdahl headquarters in California. Please indicate 560-E on your response.

FIELD ENGINEERS

You will carry the Amdahl philosophy of customer service as well as your expertise into the field, utilizing your initiative and talents to aid the customer in restoring computer center operations regardless of the origin of the failure. Large system experience essential, preferably on compatible equipment. Please indicate 567-3E on your response and direct it to the Amdahl regional office nearest you as shown below.

FIELD ENGINEERS: TEMPORARY DUTY IN EUROPE

Immediate openings for field engineers to work at Amdahl installations in Europe as an initial assignment. You will join the permanent field engineering staff, with your first assignment being approximately one year in Europe. Same qualifications as stated elsewhere in this ad for field engineers. Please indicate 905-E on your response.

Amdahl Corporation
1250 East Arques Avenue
Sunnyvale, California 94086

Amdahl Corporation
680 Fifth Avenue
New York, New York 10019

Amdahl Corporation
2021 Spring Road
Oak Brook, Illinois 60521

Amdahl Corporation
22150 Greenfield Road
Oak Park, Michigan 48237

Amdahl Corporation
5454 Wisconsin Avenue, Suite 1535
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Become a member of the team at Harris Data Communications that is working at the state-of-the-art-level in developing a sophisticated family of distributed processing and data communications systems. Our products are used by many of the nation's leading corporations and work is not dependent upon government contracts or funding.

SYSTEMS PROGRAMMERS

You should have a degree and two or more years of ASSEMBLY language programming experience. Knowledge of and experience in developing Operating Systems, Source Data Entry Systems, Inquiry Response Systems, Compilers and/or SDLC communications systems is desirable.

HARDWARE MAINTENANCE INSTRUCTOR

The successful candidate will be knowledgeable in instruction techniques and will have maintained computer equipment, preferably remote terminal equipment.

SOFTWARE INSTRUCTOR

Successful applicant will have interest in a training career and will have 2-3 years general programming experience. The individual will be knowledgeable in applications and ASSEMBLY language programming. Responsibilities will include teaching how our software operates and systems configuration to Field Engineers.

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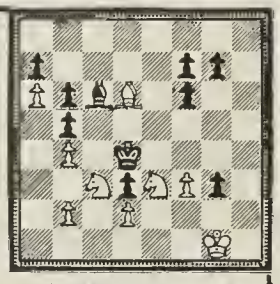

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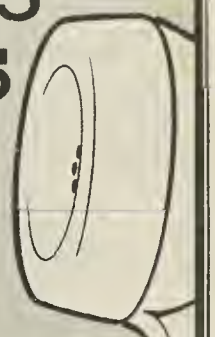

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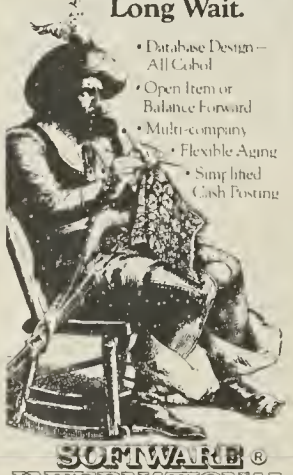

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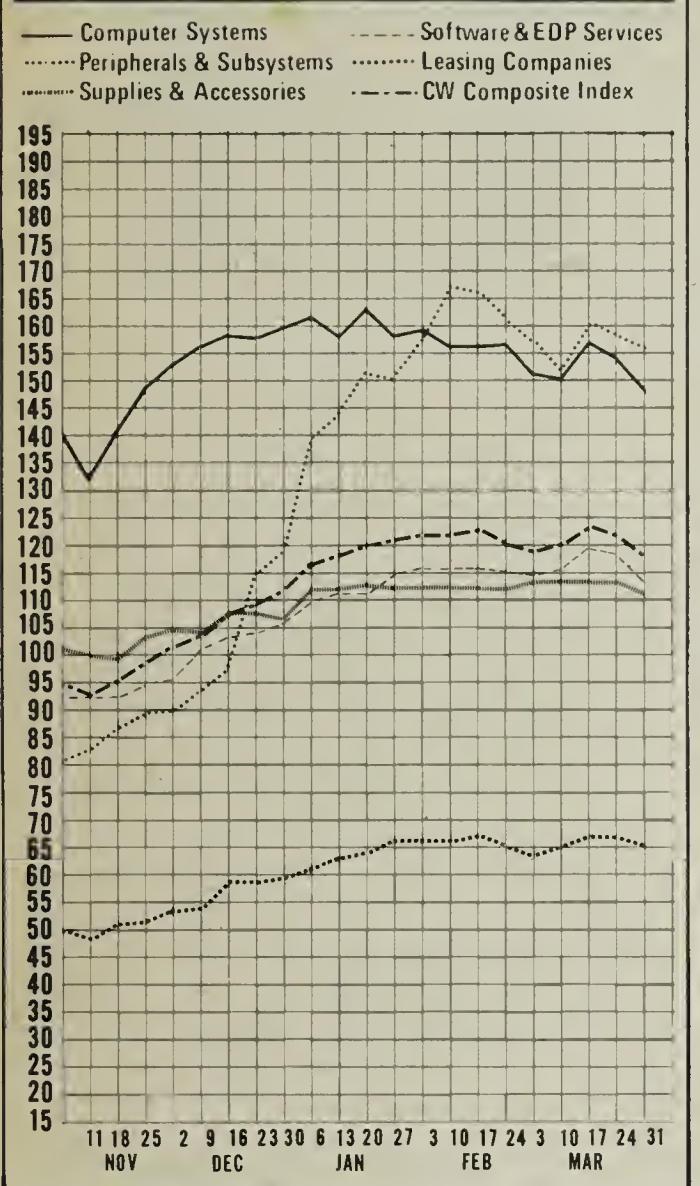

Earnings Reports

AMPEX
Three Months Ended Jan. 29

	1977	1976
Shr Ernd	$.34	$.19
Revenue	69,905,000	60,802,000
Tax Cred	1,338,000	588,000
Earnings	3,726,000	2,029,000
9 Mo Shr	.77	.66
Revenue	209,190,000	190,492,000
Tax Cred	2,838,000	2,716,000
Earnings	8,371,000	7,188,000

ANALOG DEVICES
Three Months Ended Jan. 29

	1977	1976
Shr Ernd	$.32	e$.26
Revenue	10,904,000	8,568,000
Earnings	516,000	403,000

e-Adjusted for 5% stock dividend in April 1976.

ANDERSON JACOBSON
Three Months Ended Dec. 31

	1976	1975
Shr Ernd	$.12	$.09
Revenue	5,282,000	4,341,000
Earnings	273,000	225,000
9 Mo Shr	.33	.26
Revenue	15,279,000	12,771,000
Earnings	769,000	647,000

AT&T
Yeer Ended Dec. 31

	1976 (000)	1975 (000)
Shr Ernd	$6.05	$5.13
Revenue	32,815,582	28,957,241
Earnings	3,829,151	3,147,722

BOLT BERANEK & NEWMAN
Three Months Ended Dec. 31

	1976	1975
Shr Ernd	$.07	.....
Revenue	7,262,900	$5,275,300
Disc Op	e197,100	(354,800)
Earnings	89,100	(540,800)
6 Mo Shr	.12	.....
Revenue	13,483,600	10,780,300
Disc Op	e432,200	(466,400)
Earnings	157,000	(652,900)

a-Includes $349,000 from sale of BBN Geomerine Services Co.

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TRADE*QUOTES

Computerworld Stock Trading Summary

CLOSING RRICES WEONESOAY, MAPCH 30, 1977

All statistics compiled, computed and formatted by TRADE★QUOTES, INC. Cambridge, Mass. 02139

EXCH		1976-77 RANGE (1)	CLOSE MAR 30 1977	WEEK NET CHNGE	WEEK PCT CHNGE
	COMPUTER SYSTEMS				
O	AMDAHL CORP	23- 40	25 3/4	-1	-3.7
N	BURROUGHS CORP	61-108	60 3/4	-6 1/8	-9.1
O	COMPUTER AUTOMATION	10- 5	23 5/8	- 3/8	-1.5
N	CONTROL DATA CORP	18- 27	21 3/4	- 1/2	-2.2
N	DATA GENERAL CORP	40- 60	41 1/2	-2	-4.5
O	DATAPOINT CORP	20- 46	20 1/4	-1	-4.7
N	DIGITAL EQUIPMENT	41- 60	41 1/2	-4 1/2	-9.7
N	ELECTRONIC ASSOC.	2- 5	2 1/8	- 1/8	-5.5
A	ELECTRONIC ENGINEER.	7- 16	8 5/8	- 1/8	-1.4
O	FOUR-PHASE SYSTEMS	13- 21	14 3/4	- 5/8	-4.0
N	FOXBORO	28- 51	48 7/8	+ 3/8	+0.7
O	GENERAL AUTOMATION	4- 11	6	- 3/8	-5.8
O	GPI COMPUTER CORP	1- 1	5/8	0	0.0
N	HEWLETT-PACKARD CO	69-117	74 7/8	-1 1/8	-1.4
N	HONEYWELL INC	34- 56	47 1/4	-3 1/4	-6.4
N	IBM	227-288	276 5/8	-5 7/8	-2.0
O	MANAGEMENT ASSIST	1- 9	6 3/8	- 1/2	-7.2
O	MEMOREX	17- 33	24 3/4	-2 7/8	-10.4
O	MICROCOATA CORP	7- 28	7 5/8	- 3/8	-4.6
O	MODULAR COMPUTER SYS	3- 14	5 5/8	- 1/8	-2.1
N	NCR	24- 38	36 3/4	- 1/8	-0.3
O	PRIME COMPUTER INC	4- 8	14 5/8	- 1/8	-0.8
N	PERKIN-ELMER	18- 27	17 7/8	+ 1/4	+1.4
N	RAYTHEON CO	45- 67	55 3/8	+ 1/8	+0.2
N	SPERRY RAND	35- 52	35 1/4	-3 1/2	-9.0
O	SYCOP INC	9- 11	10 1/2	- 1/4	-2.3
A	SYSTEMS ENG. LABS	5- 10	5 1/2	- 1/8	-2.2
N	VARIAN ASSOCIATES	12- 9	16 1/2	-1 1/8	-6.3
A	WANG LABS.	11- 20	16 1/4	-1	-5.7
	LEASING COMPANIES				
O	BOOTHE COMPUTER CORP	1- 9	10 3/8	- 3/8	-3.4
O	COMDISCO INC	3- 13	10 1/4	- 3/4	-6.8
A	COMMERCE GROUP CORP	2- 3	2	+ 1/8	+6.6
A	COMPUTER INVSTRS GRP	1- 3	1 1/8	0	0.0
M	DATRONIC RENTAL	1- 8	1 1/8	- 1/8	-10.0
A	DCL INC	1- 2	1 1/4	- 1/2	-28.5
N	DPE INC	5- 8	6 7/8	- 1/2	-6.7
N	ITEL	6- 16	13 7/8	- 1/4	-1.7
N	LEASCO CORP	6- 22	19 3/4	+ 3/4	+3.9
O	LEASPAC CORP	0- 1	1	+ 1/4	+33.3
O	NPG INC	0- 1	1/4	0	0.0
A	PIONEER TEX CORP	6- 11	8 1/4	- 1/8	-1.4
N	U.S. LEASING	7- 2	10 3/8	0	0.0

EXCH		1976-77 RANGE (1)	CLOSE MAR 30 1977	WEEK NET CHNGE	WEEK PCT CHNGE
	SOFTWARE & EDP SERVICES				
O	ADVANCED COMP TECH	1- 3	1 1/8	0	0.0
O	ANACOMP INC	6- 11	7 7/8	- 1/4	-3.0
A	APPLIED DATA RES.	2- 7	5 1/2	- 1/8	-2.2
N	AUTOMATIC DATA PROC	17- 35	25 5/8	- 1/2	-1.9
O	COLEMAN AMERICAN COS	2- 6	1 5/8	- 3/8	-18.7
O	COMPU-SERV NETWORK	3- 15	13 3/4	- 1/4	-1.7
O	COMP ELECTION SYSTMS	5- 9	6 3/4	- 1/2	-6.8
O	COMPUTER HORIZONS	1- 2	1 1/4	0	0.0
O	COMPUTER NETWORK	2- 8	6 1/8	- 1/2	-7.5
N	COMPUTER SCIENCES	4- 9	7 1/2	- 1/8	-1.6
O	COMPUTER TASK GROUP	1- 2	1 1/4	0	0.0
O	COMPUTER USAGE	2- 6	2 1/8	0	0.0
O	COMSHARE	2- 9	5 1/4	- 1/4	-4.5
O	DATA DIMENSIONS INC	2- 5	4 1/8	- 3/8	-8.3
O	DATATAB	1- 2	2	- 1/4	-11.1
N	ELECTRONIC DATA SYS.	12- 19	16	- 3/8	-2.2
O	INFONATIONAL INC	1- 1	1/8	0	0.0
O	INSYTE CORP	1- 3	1 3/4	- 1/8	-6.6
O	IRS COMPUTER MARKET.	1- 2	3/4	0	0.0
O	KEANE ASSOCIATES	2- 4	2 7/8	0	0.0
O	KEYDATA CORP	1- 5	2 1/2	- 1/4	-9.0
A	LOGICON	3- 16	14 3/4	-1	-6.3
A	MANAGEMENT DATA	1- 3	1 1/4	- 1/8	-9.0
A	NATIONAL CSS INC	13- 25	19 1/2	- 3/4	-3.7
O	NATIONAL DATA CORP	4- 7	5 3/8	- 1/8	-2.2
A	ON LINE SYSTEMS INC	17- 23	18 3/8	- 1/4	-1.3
N	PLANNING RESEARCH	3- 5	3 5/8	- 1/8	-3.3
O	PROGRAMMING & SYS	1- 1	5/8	0	0.0
O	PARICATA INC	2- 5	1 3/4	0	0.0
O	REYNOLDS & REYNOLD	13- 21	16 1/2	- 1/2	-2.9
O	SCIENTIFIC COMPUTERS	1- 2	1 7/8	- 1/8	-6.2
O	TYMSHARE INC	14- 28	17	-1	-5.5
A	UPS SYSTEMS	3- 5	4 1/4	0	0.0
N	WYLY CORP	1- 7	1 1/2	0	0.0
	PERIPHERALS & SUBSYSTEMS				
N	ADDRESSOGRAPH-MULT	8- 14	10 3/4	-1	-8.5
O	ADVANCED MEMORY SYS	4- 10	6 5/8	- 5/8	-8.6
N	AMREX CORP	5- 0	8 1/4	0	0.0
O	ANDERSON JACOBSON	2- 4	3 7/8	- 1/8	-3.1
N	APPLIED DIG DATA SYS	10- 25	11 1/4	- 1/2	-4.2
O	BEEHIVE MEDICAL ELEC	3- 12	10 7/8	+ 1/8	+1.1
A	BOLT,BERANEK & NEW	7- 11	7	- 1/4	-3.4
N	BUNKER-RAMO	5- 12	10 5/8	- 5/8	-5.5
A	CALCOMP	3- 7	3	- 1/8	-4.0
O	CAMBRIDGE MEMORIES	0- 6	1	- 1/8	-14.9
N	CENTRONICS DATA COMP	20- 36	23 1/2	- 3/4	-3.0
O	CODEX CORP	22- 47	46 7/8	+1 3/8	+3.0
O	COGNITRONICS	1- 1	7/8	- 1/8	-12.5
O	COMPUTER COMMUN.	1- 6	5 5/8	- 1/2	-8.1
O	COMPUTER CONSOLES	4- 7	4 1/4	0	0.0
A	COMPUTER EQUIPMENT	1- 3	2 1/4	0	0.0
O	COMPUTER TRANSCEIVER	1- 3	1 1/8	- 1/4	-18.1
O	CONTEN	4- 13	11 1/4	- 1/2	-4.2
N	CONRAC CORP	20- 27	24 1/2	- 3/8	-1.5

EXCH		1976-77 RANGE (1)	CLOSE MAR 30 1977	WEEK NET CHNGE	WEEK PCT CHNGE
O	DATA ACCESS SYSTEMS	1- 5	5 1/2	0	0.0
O	DATA 100	6- 13	7 1/2	- 1/8	-1.6
A	DATA PRODUCTS CORP	5- 15	10 5/8	- 1/8	-1.1
O	DATA TECHNOLOGY	1- 3	2 3/4	0	0.0
O	DATUM INC	1- 2	1 1/2	0	0.0
O	DECISION DATA COMPUT	1- 4	1 7/8	- 1/8	-6.2
O	DELTA DATA SYSTEMS	1- 1	1/2	0	0.0
N	ELECTRONIC M & M	1- 5	4 5/8	- 1/8	-2.6
O	FABRI-TEK	1- 2	1 3/8	+	+4.5
O	GENERAL COMPUTER SYS	0- 2	1/2	+ 1/8	+33.3
N	HAZELTINE CORP	4- 12	10	- 3/8	-3.6
N	HARRIS CORP	27- 35	34 5/8	+ 1/8	+0.3
A	INCOTERM CORP	9- 20	13 1/2	- 1/8	-0.9
O	INFOREX INC	3- 7	4 3/4	- 5/8	-11.6
O	INFORMATION INTL INC	10- 18	11 3/4	- 1/2	-4.0
O	INTEL CORP	45-109	45 1/2	-4 1/2	-9.0
A	LUNAR ELECTRONICS	3- 7	4 3/8	+ 5/8	+16.6
O	MSI DATA CORP	3- 8	7 3/8	- 1/8	-1.6
N	MILGO ELECTRONICS	15- 37	37 1/8	0	0.0
N	MOHAWK DATA SCI	3- 10	5 5/8	- 1/8	-2.1
O	PENRIL CORP	1- 3	3 7/8	0	0.0
A	PERTEC CORP	3- 9	7	- 1/8	-1.7
A	ROTTER INSTRUMENT	2- 2	1 3/4	0	0.0
O	PRECISION INST.	2- 10	2	0	0.0
O	QUANTOR CORP	4- 6	4 3/8	- 1/8	-2.7
O	RECOGNITION EQUIP	6- 11	7 7/8	- 1/8	-1.5
O	SCAN DATA	1- 4	1 1/4	-	-4.5
O	STORAGE TECHNOLOGY	9- 13	10 3/8	- 3/4	-6.7
O	T BAR INC	5- 10	8 7/8	0	0.0
O	TALLY CORP.	4- 6	5 1/4	0	0.0
O	TEC INC	3- 9	7 1/4	- 1/4	-3.3
N	TEKTRONIX INC	45- 69	59 7/8	+ 1/8	+0.2
N	TELEX	2- 5	2 5/8	0	0.0
O	WILTEK INC	1- 2	1/8	- 1/8	-50.0
	SUPPLIES & ACCESSORIES				
O	BALTIMORE BUS FORMS	2- 5	2 3/8	- 1/4	-9.5
A	BARRY WRIGHT	6- 13	11 7/8	- 1/8	-1.0
O	CYBERMATICS INC	0- 1	1/2	0	0.0
O	DUPLEX PRODUCTS INC	13- 24	16 7/8	- 1/8	-0.7
N	ENNIS BUS. FORMS	6- 8	6 3/8	0	0.0
O	GRAHAM MAGNETICS	8- 14	12 1/2	- 1/2	-3.8
O	GRAPHIC CONTROLS	13- 19	14 3/4	0	0.0
N	3M COMPANY	49- 66	50 1/8	-1 3/4	-3.3
O	MOORE CORP LTD	31- 51	33	0	0.0
N	NASHUA CORP	11- 20	16 3/4	0	0.0
O	STANDARD REGISTER	15- 21	19 1/4	-1 1/2	-7.2
O	TAB PRODUCTS CO	5- 17	15 1/2	-1	-6.0
N	UARCO	19- 25	20 1/4	0	0.0
A	WABASH MAGNETICS	4- 14	13 1/4	+ 1/8	+0.9
N	WALLACE BUS FORMS	18- 25	18 1/2	0	0.0

EXCH: N=NEW YORK; A=AMERICAN; P=RHIL-BALT-WASH
L=NATIONAL; M=MIDWES ; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

LINEUP

Old IBM sorts n-e-v-e-r die, they just fade away into 2nd, 3rd and 4th place. Behind SyncSort!

Call (201) 568-9700

Find out why SyncSort should be on first in your place.

Gosh, the spring sorting season is *murder* on these veteran IBM sorts!

How their bones and muscles seem to creak as they struggle to get into shape for those double-header benchmark tests on steaming summer days.

Will SM1-5740, SM1-5734 and old SMO23 ever recover fully from all those heel spurs, shin splints and sore elbows?

Frankly, the prognosis is not good. *Because as of March 1, our SyncSort III-and-a-half became the most popular sort in North America!*

Here are the standings, as relayed to us by our scout in the Grapefruit League:

ANALYSIS OF SORTING MARKET*
OS & OS/VS
(U.S. and CANADA)

Rank	Sort	OS Users	OS/VS Users	Total Users	% of Market
1	SyncSort	455	742	1197	36.8
2	IBM SM1-5734	958	129	1087	33.4
3	IBM SM1-5740	NA	603	603	18.5
4	IBM SMO23	263	NA	263	8.1
5	Other	75	30	105	3.2
	Totals:	1751	1504	3255	100.0

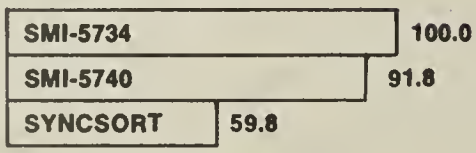
(In addition, SyncSort has over 300 users overseas)

Are we proud that we're No. 1? Sure. Who else do you know who's taken 36.8% of *any* market away from the Computer Giant? (You can count the names on the finger of one finger!)

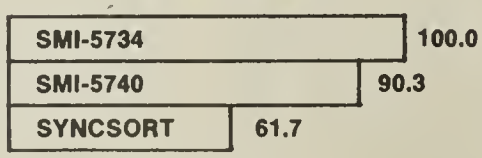
The main reason for SyncSort's primacy is simply performance. It does more sorting work at less cost in machine resources.

Matched against the "tottering threesome" it will give you savings on the following order:

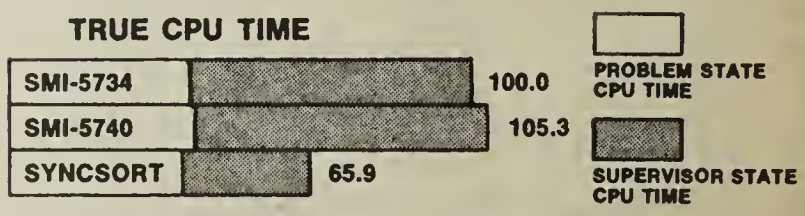
I/O ACTIVITY



ELAPSED TIME



TRUE CPU TIME



Of course, there is one danger to being No. 1. Those nifty little sorting techniques, on which you expended so much blood, sweat, toil and tears, have a way of showing up regularly in your competitor's sorts.

But we treat that as just another part of the game — like the spit ball. And we keep adding new techniques today to make sure that our competitors will have something to emulate in the years ahead.

We understand that, at this very moment, the Computer Giant is bringing up a new rookie from the One-Eye League. Will the kid have anything on the ball? Or will he turn out to be just another bonus baby?

We don't know. But we will make one prediction, When he gets out there on the field in major-league sorting, with its flashing spikes, beanballs and salty language, he'll receive quite an education!

*Supporting data on request.

OVERSEAS REPRESENTATIVES —

Brussels: CAP/GEMINI/CES
Dusseldorf: CAP/GEMINI GmbH
Geneva: CAP/SOGETI
Hague: CAP-GEMINI/PANDATA
Johannesburg: Computing Benefits, Ltd.
London: GEMINI Ltd.
Melbourne: Shell Oil Co. of Australia
Milan: SYNTTAX
Paris: CAP/SOGETI PRODUITS
Sao Paulo: Deltacom do Brasil
Stockholm: BRA
Tel Aviv: ADVANCED TECHNOLOGY, Ltd.
Vienna: Ratio

WHITLOW

COMPUTER SYSTEMS Inc. 560 Sylvan Ave., Englewood Cliffs, N.J. 07632